SOI: 1.1/TAS
DOI: 10.15863/TAS
Scopus ASJC: 1000

ISSN 2308-4944 (print)
ISSN 2409-0085 (online)

№ 04 (108) 2022

Teoretičeskaâ i prikladnaâ nauka

Theoretical & Applied Science

Philadelphia, USA

Teoretičeskaâ i prikladnaâ nauka

Theoretical & Applied Science

04 (108)

2022

International Scientific Journal

Theoretical & Applied Science

Founder: **International Academy of Theoretical & Applied Sciences**

Published since 2013 year. Issued Monthly.

International scientific journal «Theoretical & Applied Science», registered in France, and indexed more than 45 international scientific bases.

Editorial office: http://T-Science.org Phone: +777727-606-81

E-mail: T-Science@mail.ru

ISSN 2308-4944

9 772308 494225 04

International Scientific Journal

Theoretical & Applied Science

International Scientific Journal

Theoretical & Applied Science

ISJ Theoretical & Applied Science, 04 (108), 772.
Philadelphia, USA

Impact Factor ICV = 6.630

Impact Factor ISI = 0.829
based on International Citation Report (ICR)

The percentage of rejected articles:

ISSN 2308-4944

Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
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SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2022 **Issue:** 04 **Volume:** 108
Published: 12.04.2022 **http://T-Science.org**

Issue Article

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THE IMPORTANCE AND RAW MATERIAL OF EPYCHLORGYDRINE FOR THE PRODUCTION OF MEMBRANES FROM IONITES MADE ON THE BASIS OF LOCAL RAW MATERIALS

Abstract: *In this work to obtain hydrogen chloride gas in the presence of sodium chloride and sulfuric acid and to synthesize α-monochlorohydrin, b-monochlorohydrin, a-dichlorohydrin, b-dichlorohydrin in high yield by binding to glycerol. IR-spectral analysis, raw materials, conditions and methods of epichlorohydrin synthesis are studied.*

Key words: *Epichlorohydrin, glycerol, α-monochlorohydrin, β-monochloride, α-dichlorohydrin, β dichlorohydrin, triglycidylamine, 1-amino-2,3-epoxypropane, sodium chloride, sulfuric acid, acetic acid, sodium hydroxide, hydrogen peroxide.*

Language: *English*

Citation: Bozorov, Y. Sh., Turaev, X. X., Aliqulov, R. V., & Safarov, A. M. (2022). The importance and raw material of epychlorgydrine for the production of membranes from ionites made on the basis of local raw materials. *ISJ Theoretical & Applied Science, 04 (108),* 301-305.

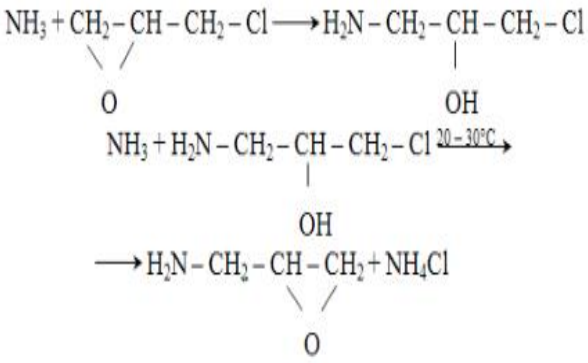
Soi: http://s-o-i.org/1.1/TAS-04-108-36 ***Doi***: https://dx.doi.org/10.15863/TAS.2022.04.108.36

Scopus ASCC: *1600.*

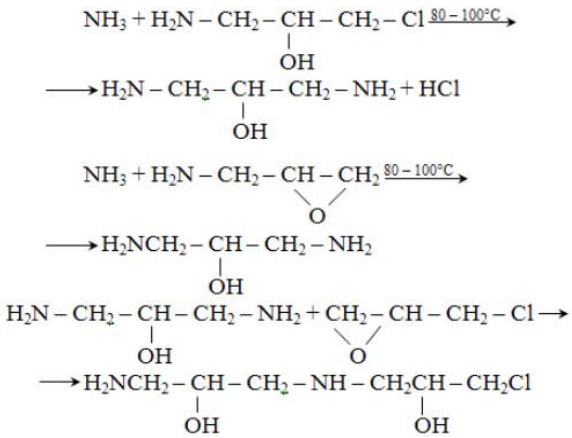
Introduction

In addition to the enrichment of metals, it is important to use membranes obtained mainly on the basis of ion exchangers in the separation of secondary metals, which are separated as waste. It is also important to protect and use water resources wisely.In addition to improving water quality, physicochemical methods, such as membrane, electrochemical, etc., eliminate drainage, which allows the reuse of water in technological processes. The reuse of water in the process allows for the reduction of fresh water consumption, the return of contaminated water to the production of valuable components lost as a result of discharge and previous drainage. The use of multifunctional high-capacity ion exchangers and membranes allows to solve the current problems of import substitution in the development of waste-free sorption technologies and treatment of industrial effluents, as well as the extraction of additional metals from gold ions. The development and improvement of

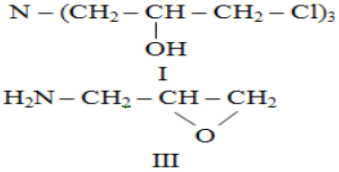
the Republic of Uzbekistan requires the use of new local products in hydrometallurgy, food, pharmaceuticals and other fields. Isolation of rare-earth metal ions in low-grade ores from membranes with high physicochemical, sorption sorbents allows to solve problems related to environmental protection and optimization of use of natural resources. At the same time, the demand for modern competitive technological lines based on the use of ion exchange materials and reusable materials is high. Thus, the production of membranes that can bind new sorbents with high sorption capacity, as well as the study of their physicochemical properties is a current and promising area of modern chemical technology and ecology.We will focus on the properties and production methods of epichlorohydrin, which is widely used in ion exchange and membrane synthesis. Epichlorohydrin has a higher selectivity than nitrogen compounds, so nitrogen-containing epoxy monomers and polymers are used in various fields of chemical production. Epichlorohydrin reacts with ammonia at room temperature according to the following scheme:

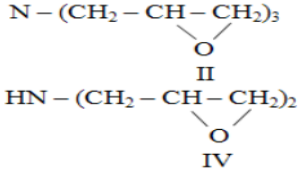


The first ammonia molecule is added to the epichlorohydrin by opening the epoxy ring, the second leads to dehydrochlorination. Increasing the temperature to 80-100 ° C leads to the formation of water-soluble products of polymer nature.



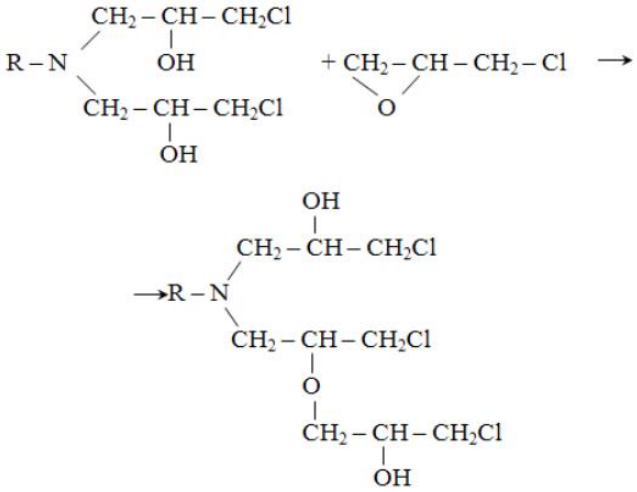
An excess amount of epichlorohydrin in the reaction leads to the formation of the following products.



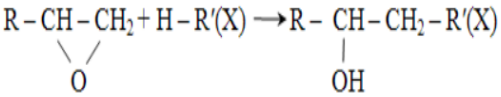


Specificity of the reaction The probability of formation of triglycidylamine (II) is high. Triglycydilamine is then crystallized with sopelemers at 45–46 °C and can be purified by distillation because it does not polymerize. 1-amino-2,3-epoxypropane (III) and diglycydilamine (IV) contain two active

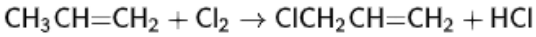
groups capable of interacting to obtain a water-soluble polymer. The hydroxyl groups obtained in the reaction system interact with the residual epoxy groups.



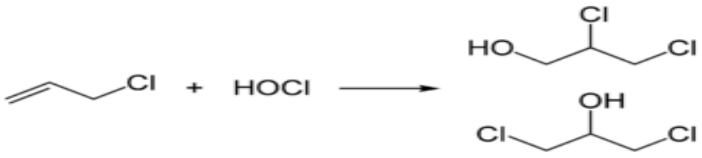
It can be concluded that if the primary monomers are oriented relative to each other, the nucleophilic agent is attached to the more hydrogenated carbon atom:



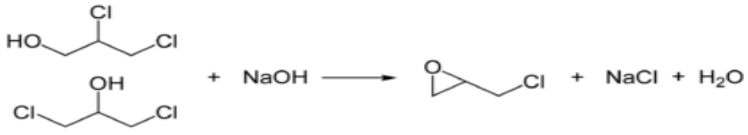
Other possible directions of the reaction may vary depending on the acidity or basicity of the reaction. The following reactions show that membranes can be synthesized by binding ion exchangers to amino groups in epichlorohydrin.The obtained substances can be made resistant to external influences and elastic on the basis of fillers. There are several methods for the synthesis of epichlorohydrin,the initial modalities of which vary depending on the structure and process conditions. As an example, epichlorohydrin is obtained from propylene chlorinated at 500 °C and 18 atmospheres to allyl chloride:



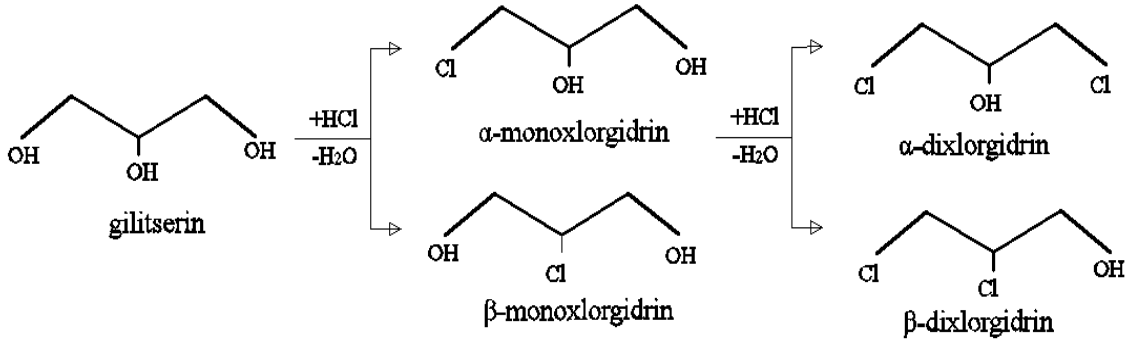
Allyl chloride is then reacted with hypochloric acid and isomeric dichlorohydrins of glycerin are obtained:



In addition, glycerin dichlorohydrins are treated with sodium hydroxide (NaOH) to form epichlorohydrin:



The resulting epichlorohydrin vapor is separated by distillation.Chlorine can also be obtained through acrolein. We carried out the next method in the process of obtaining epichlorohydrin from glycerol by synthesizing the intermediate products α-monochlorohydrin, β -monochlorohydrin,α -dichlorohydrin, β-dichlorohydrin with high efficiency under optimal conditions.



The measured glycerol was first added and then 5 ml of catalyst solution was added. Then, in the middle of the first stage of the three-neck reactor, a refrigerator with a glass rod in the form of a three-part mixing sheet was placed.A thermometer was placed in the second neck, and a glass tube was placed in the last neck to deliver HCl gas, which was lowered to the bottom of the solution.A device for obtaining HCl gas was placed on this substance. NaCl (salt) was placed on the lower part and concentrated H_2SO_4 acid was placed on the upper part of the periphery. In order to purify the formed HCl gas from the chamber and deliver it to the three-neck reactor, two tubes were placed between the chamber and the three-neck reactor, one containing H_2SO_4 acid and the other close to the three-neck reactor and empty. The second tube is designed to hold the fluid in the conductor and the gas. HCl gas was purified from the following two tubes and discharged to the three-neck rector. In the Kip apparatus, the raw material is continuously changed and HCl gas is extracted and passed through glycerol at 101-106 ^{0}C for 9-10 hours for 14 days. The volume and mass of glycerol increased from yellow to dark black with the addition of chlorine. The formation of new α-monochlorohydrin, β monochlorohydrin, α-dichlorohydrin, β dichlorohydrin as a result of the passage of HCl gas through the resulting substance into glycerol was determined and then weighed. In the last 12-14 days, HCl gas has been observed to pass unchanged without good coupling, and our substance in the three-neck reactor has increased from 1 kg to 1,860 kg.

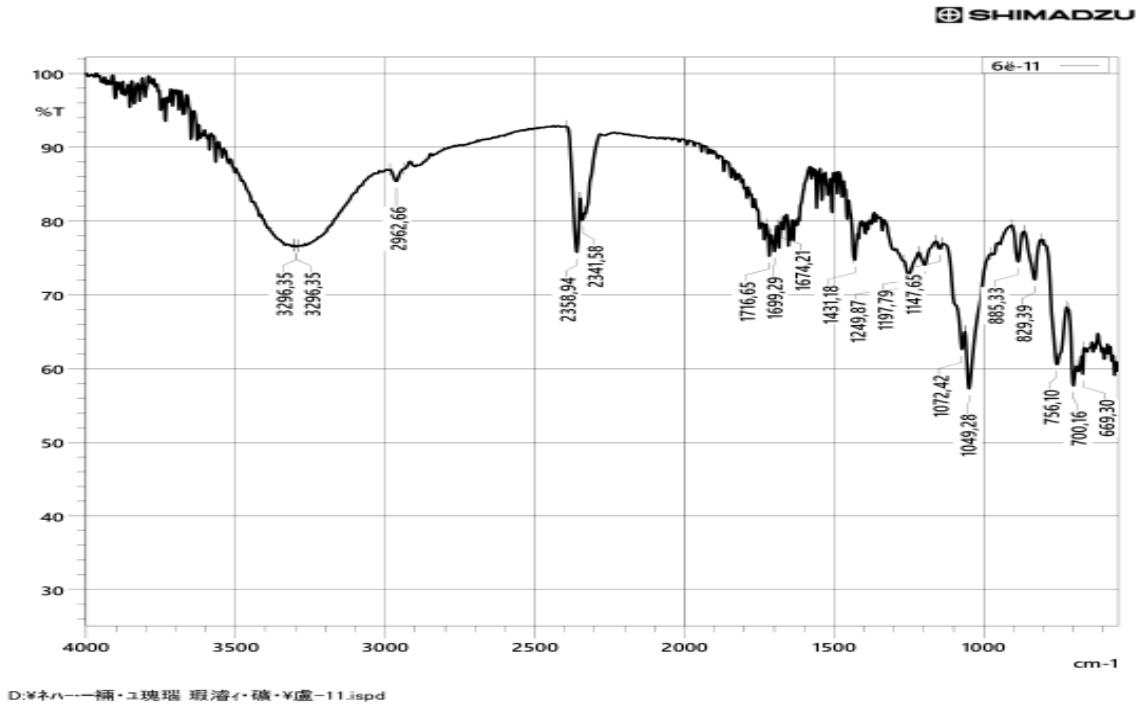


Figure 1. IK spectrum of α-monochlorohydrin, β monochlorohydrin, α-dichlorohydrin, β dichlorohydrin formed by combining HCl gas with glycerol.

The values in Figure 1 show the valence oscillations of the -O-H group in the area 3296.35 cm-1, the valence oscillations of the CH_2 bond in the range 1431.18 cm-1, the compatibility of the valence oscillations of the 669 cm-1 C-Cl bond.It can be seen from the following spectrum that for the synthesis of epichlorohydrin it is possible to produce a-monochlorohydrin, b-monochlorohydrin, a-dichlorohydrin, b-dichlorohydrin with high yields from convenient local raw materials.

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SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2022 **Issue:** 04 **Volume:** 108

Published: 13.04.2022 **http://T-Science.org**

Issue Article

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CALCULATION OF RADIATION DOSES USING A MATHEMATICAL PHANTOM AND THE FLUKA SOFTWARE PACKAGE

Abstract: *this paper shows the simulation of the Fisher-Snyder computational mathematical phantom published in the ICRP journal 23 in the FLUKA software package (with the Flair interface).*

Key words: *mathematical (stylized) phantom, dose, dose of equivalent, FLUKA, Flair, Fisher-Snyder phantom, Computational phantom, ICRP 23.*

Language: *Russian*

Citation: Rakhimjonov, J. S., Tuychibaev, B. K., Tolaboev, D. X., Nematov, X. M., & Tuymuradov, A. A. (2022). Calculation of radiation doses using a mathematical phantom and the FLUKA software package. *ISJ Theoretical & Applied Science, 04 (108)*, 306-311.

Soi: http://s-o-i.org/1.1/TAS-04-108-37 ***Doi***: https://dx.doi.org/10.15863/TAS.2022.04.108.37

Scopus ASCC: *2611.*

РАСЧЕТ ДОЗ ОБЛУЧЕНИЯ ПРИ ИСПОЛЬЗОВАНИИ МАТЕМАТИЧЕСКОГО ФАНТОМА И ПРОГРАММНОГО КОМПЛЕКСА FLUKA

Аннотация: *в этой работе показано моделирование вычислительного математического фантома Фишера-Снайдера опубликованной в журнале МКРЗ 23 в программном комплексе FLUKA (с интерфейсом Flair) и приведены расчёт эквивалентной дозы при облучении гамма фотоном при энергии 1МэВ.*

Ключевые слова: *математический (стилизованный) фантом, FLUKA, Flair, фантом Фишера-Снайдера, вычислительный фантом, МКРЗ 23*

Введение

Сегодня существует множество способов проведения дозиметрических расчетов. Одним из самых распространенных и современных принято считать применение программных кодов, основанных на использовании метода Монте-

Карло для моделирования переноса излучения через вещество, что, в свою очередь, позволяет провести также и расчеты дозовых нагрузок [1] [2].

Для проведения расчетов используются разные модели человека или так называемые фантомы. Они отличаются как внутренними параметрами, так и способом создания, так как могут быть сделаны разными методами. В данной работе проводились дозиметрические расчеты гамма-излучения с использованием одного из типов таких моделей – математического фантома и программного комплекса FLUKA для следующих целей:

1. Продемонстрировать и апробировать возможности программного средства FLUKA относительно использования математических фантомов;
2. Подготовить параметры модели для дозовых расчетов для математического модели;
3. Подобрать параметры источника излучения для проведения дальнейших сравнительных расчетов;
4. Провести дозовые расчеты с использованием математического фантома и FLUKA.

Математическая модель человека является достаточно устаревшей, но до сих пор может использоваться для решения широкого диапазона дозиметрических задач. Большое внимание было уделено переносу математического фантома в формат входных файлов используемых FLUKA. Развитие моделей происходило постепенно – от более простых и примитивных к сложным и детальным [3].

С использованием математического фантома MIRD5-ORNL ранее уже проводилось множество дозиметрических расчетов, в том числе сравнительных [11][12][13]. Однако мы задаёмся целью переноса фантома MIRD5-ORNL в входной формат FLUKA, сделать дозовые оценки, подобрать конфигурацию источника и в последующем сравнить результаты с мужским и женским воксельными фантомами ICRP-110 [10].

МЕТОДЫ И СРЕДСТВА

Для проведения расчетов были использованы программный комплекс FLUKA и программа flair, которая представляет собой многофункциональный графический интерфейс, созданный для FLUKA. Также был использован математический стилизованный фантом взрослого человека MIRD-ORNL описанный в работе [5].

Математический фантом. Описания фантомов будут следовать формату Снайдера и Кристи [5]. Фантом состоит из трех основных секций: (1) эллиптического цилиндра, представляющего туловище и руки; (2) двух усеченных круглых конусов, представляющих ноги и ступни; и (3) эллиптического цилиндра, увенчанного половиной эллипсоида, представляющего голову и шею. К ногам прикреплен небольшой участок с плоской передней поверхностью для размещения яичек.

Рост математической модели равен 176 см. Модель соответствует по размеру модели Снайдера. Математический фантом включает следующие части: голова, ноги, ноги, руки, таз, костный мозг, 12 рёбер, надпочечники, головной мозг, желудок, тонкий кишечник, верхняя часть толстой кишки, почки, печень, легкие, яичники, поджелудочная железа, селезенка, яички, вилочковая железа, щитовидная железа, мочевой и матка.

МОДЕЛИРОВАНИЕ ФАНТОМА

Моделирование математического фантома в FLUKA является существенной частью данной работы. Для создания фантома используется множество комбинаций геометрических примитивов, заданных в работе [5] в форме уравнений поверхностей второго порядка. Геометрический модуль FLUKA работает с замкнутыми объемами и их объединениями – так называемыми регионами. Регионы составляются из отдельных геометрических блоков – тел с соответствующими параметрами, включающих такие распространенные тела как:

- Шар;
- Цилиндр;
- Эллипсоид;
- Различные плоскости;
- Параллелепипед;
- Усеченный конус.

К регионам производится привязка определенных материалов, задание которых происходит также в рамках входного файла. Моделирование происходит путём построения тела человека через комбинацию регионов из геометрических фигур. Данный процесс требует выбора наиболее похожей геометрической фигуры для аппроксимации определенного органа человека. Кроме этого, объём и масса этой фигуры должны соответствовать объёму и массе соответствующего органа организма. Через задание геометрических фигур мы получаем геометрическое тело человека.

ПРОВЕДЕНИЕ ДОЗОВЫХ РАСЧЕТОВ

На рисунке 1 показан внешний вид созданного фантома. К фантому привязаны три типа тканей: скелетные, ткани легких и все другие ткани (здесь называемые "мягкими тканями"). У фантома отсутствует кровь. Элементное положение каждого типа ткани составы были получены на основе данных, содержащихся в публикации 23 МКРЗ (ICRP 1975) [13].

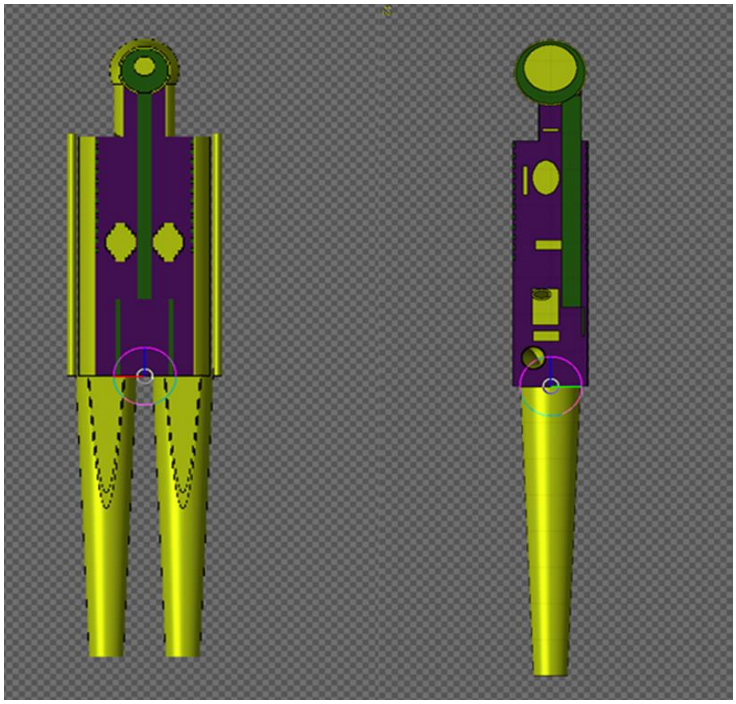

Рисунок 1. Внешний вид математического фантома в программном коде FLUKA

РЕЗУЛЬТАТЫ

Облучения были проведены в поле гамма фотонов с энергией 1 МэВ с разными положениями источника. В двух случаях использовался точечный изотропный источник, а в третьем – источник в виде сферического изотропного слоя, который моделировал изотропное поле вокруг исследуемой области. Рост математической модели 176 см. Поэтому в одном случае изотропный источник находится перед фантомом на высоте 1 м и 45 см от позвоночника фантома, потому что такое расположение фантома и источника похоже на расположение человека, который работает с непосредственно радиоактивными источниками или на манипуляторе. В другом расчете координата источника по осям “*x*” и “*z*” соответствует с координатой центр массы фантома, а по оси “*y*” он располагает на расстоянии 30 см перед фантомом. Расчёт проводился на 3 миллионах частиц. На таком количестве частиц статическая погрешность для всех органов будет не более 5 %.

Ниже в таблицах 1,2 и 3 указаны результаты облучения. Таблица 1 отражает дозовые расчеты для изотропного источника на расстоянии 45 см. от позвоночника модели, не учитывается центр массы. В таблице 2 приведены результаты для сферического равномерного источника с радиусом 100 см. Сферический изотропный источник окружает фантома, который находится в его центре. Такое положение источника и фантома позволяет получить информацию о том, какой из органов получает большую дозу в однородном поле гамма-квантов.

Таблица 1. Доза на органы для точечного изотропного источника на расстоянии 45 см от позвоночника

Органы	Масса, грамм	Доза, пЗв	Погрешность, %
Ребро	887	1,49E-01	0,17
Надпочечники	16,3	4,16E-03	1
Мозг	1386	6,63E-02	0,25
Желудок	418	1,70E-01	0,4
Тонкий кишечник	950	5,15E-01	0,53
Почки	279,5	5,83E-02	0,55

Печень	1756	2,74E-01	0,76
Легкие	1104	5,80E-01	0,6
Кожа	3102	5,41E-01	0,45
Селезенка	187	3,80E-02	0,09
Яички	33,8	1,00E-02	0,46
Вилочковая железа	25	4,73E-03	0,52
Щитовидная железа	18	3,44E-03	1,33
Мочевой пузырь	260	1,09E-01	2,72

Таблица 2. Доза на органы для сферического источника

Органы	Масса, грамм	Доза, пЗв	Погрешность, %
Ребро	887	2,87E-02	0,34
Надпочечники	16,3	5,56E-04	3,1
Мозг	1386	6,16E-02	1,75
Желудок	418	1,52E-02	0,95
Тонкий кишечник	950	3,94E-02	0,95
Почки	279,5	9,73E-03	1,14
Печень	1756	3,12E-02	2,03
Легкие	1104	1,20E-01	0,58
Кожа	3102	1,23E-01	0,45
Селезенка	187	5,95E-03	0,17
Яички	33,8	1,15E-03	1,33
Вилочковая железа	25	9,43E-04	2,58
Щитовидная железа	18	1,46E-03	2,47
Мочевой пузырь	260	7,86E-03	2,49

В таблице 3 приведены результаты расчетов, в которых источник находится по оси *z*, *x* в центре массы фантома, а по оси *y* находится на расстоянии 30 см. от центра массы. Координаты центра массы (-1,15; -1,07; 5,1) см. Это ситуация позволяет более равномерно распределить частицы по фантому.

Таблица 3. Доза на органы для изотропного источника, находящегося напротив центра массы

Ребро	887	8,87E-02	0,21
Надпочечники	16,3	2,91E-03	3,3
Мозг	1386	4,61E-02	1,3
Желудок	418	9,74E-02	0,7
Тонкий кишечник	950	3,75E-01	1,08
Почки	279,5	4,13E-02	1,41

Печень	1756	1,72E-01	2,11
Легкие	1104	3,46E-01	0,67
Кожа	3102	5,13E-01	0,6
Селезенка	187	2,50E-02	0,26
Яички	33,8	1,26E-02	1,86
Вилочковая железа	25	2,73E-03	2,43
Щитовидная железа	18	2,10E-03	2,14
Мочевой	260	1,23E-01	2,63

ЗАКЛЮЧЕНИЕ

Моделирование математического фантома на программе FLUKA является достаточно длительным и трудоемким процессом, при объединении тел в регионы и при формировании их комбинаций. В рамках работы во входной формат программного комплекса FLUKA был перенесен фантом MIRD. Для данной модели были проведены качественные предварительные расчеты с низкими погрешностями. Наблюдается достижение низких погрешностей (несколько процентов) для приемлемого времени расчета (менее 30 минут) при использовании бюджетного компьютера с частотой процессора 2,7 ГГц. С увеличением расстояния между источником и фантомом, статическая погрешность увеличивается, и чтобы избежать этого, необходимо увеличивать число частиц. Программа позволяет непосредственно измерять дозу для каждого региона, то есть для органа индивидуально, что позволяет в дальнейшем вводить любые весовые коэффициенты качества излучения для каждого из органов.

Для точечных изотропных источников, находящихся напротив центра масс в точке (-1,15; -1,07; 5,1) см и по координатам (0; 0; 20) см., результаты близки. Увеличение дозы для источника на высоте 1 м. объясняется тем, что данная точка расположена ближе к рассматриваемым органам.

Для сферического изотропного источника необходима нормировка и строго прямое сравнение со случаями точечного источника невозможно. Фиксированная мощность источника в сферическом случае распределена на область пространства сферического слоя, тогда как в случае точечного источника она сконцентрирована в одной точке. Дозы для данного источника не имеют зависимости от положения, как точечном случае, поэтому возможна оценка влияния модели и устройства органов в ней на результаты расчетов.

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Impact Factor:					
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	GIF (Australia) = 0.564	ESJI (KZ) = 8.771	IBI (India) = 4.260
	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2022 **Issue:** 04 **Volume:** 108
Published: 13.04.2022 **http://T-Science.org**

Issue Article

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FORMATION OF ENTOMOFAUNA IN THE SYSTEM OF SOWING COTTON-GRAIN ALTERNATIONS AND METHODS OF MANAGING THE NUMBER OF PESTS

Abstract: *In the article In these studies, it was established that in cotton agro phytocoenosis, pests can only be controlled by natural organic (agrotechnical, biological, etc.) methods under conditions when the ratio between phytophages and entomophagy is favorable for beneficial insects. It has been established that the cotton-grain crop rotation system leads to a natural reduction in pests. Especially in areas with cereals after cotton, the incidence of rust is 2-3 times lower, weed infestation is 3-4 times lower, and on cotton after cereals, a 3-4 times decrease in the main harmful pests and a decrease in the development of verticillium and fusarium wilt by 25 -thirty%. The results of the study showed that in the early stages of the development of aphids, thrips, and spider mites, in the prevention of pests, 75-80% of the area is treated with low-toxic complex insecticides with a width of 20-30 meters from the edge of the lateral planting method with biological and agrotechnical methods, good results were noted. Lateral tillage of the field and biological and agrotechnical control of residues reduced the infestation of cotton by aphids by 60.4%, tobacco thrips by 48.0%, cobwebby 39.2%. It is noted that weeds around the field in the system of cotton-grain crop rotation are a source of wintering and the formation of the composition of phytophages, in addition, their natural neighbors and other beneficial insects also serve, which play an important role in the formation of the cotton entomofauna and grain crops.*

Key words: *formation, entomofauna, sowing system, cotton-grain, alternation methods, population control, pest, marginal processing, entomophagy, disease weeds organic method.*

Language: *Russian*

Citation: Baltaev, B. S. (2022). Formation of entomofauna in the system of sowing cotton-grain alternations and methods of managing the number of pests. *ISJ Theoretical & Applied Science, 04 (108),* 312-320.

Soi: http://s-o-i.org/1.1/TAS-04-108-38 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2022.04.108.38

Scopus ASCC: *1100.*

ФОРМИРОВАНИЕ ЭНТОМОФАУНЫ В СИСТЕМЕ СЕВА ХЛОПКОВО-ЗЕРНОВЫХ ЧЕРЕДОВАНИЙ И МЕТОДЫ УПРАВЛЕНИЯ ЧИСЛЕННОСТЬЮ ВРЕДИТЕЛЕЙ

Аннотация: *В статье В этих исследованиях установлено, что в хлопковом агрофитоценозе бороться с вредителями можно только естественными органическими (агротехническими, биологическими и др.) методами в условиях, когда соотношение между фитофагами и энтомофагами благоприятно для полезных насекомых. Установлено, что хлопково-зерновая система севооборота приводит к естественному снижению вредителей. Особенно на участках, с зерновыми после хлопка в 2-3 раза ниже заболеваемость ржавчиной, в 3-4 раза ниже засоренность сорняками, а на хлопчатнике после зерновых выявлено снижение в 3-4 раза основных вредоносных вредителей и снижение развития вертициллезного и фузариозного увядания на 25-30%. Результаты исследования показали, что на ранних стадиях развития тлей, трипсов и паутинных клещей при профилактике вредителей на 75-80% площади обрабатывают малотоксичными комплексными инсектицидами с шириной 20-30 метров от края бокового способа посадки биологическими и агротехническими приемами отмечены хорошие результаты. Боковая обработка поля и биологический и агротехнический контроль за остатками снизили зараженность хлопчатника тлей на 60,4%, табачным*

трипсом на 48,0%, паутинкой на 39,2%. Отмечено, что сорняки вокруг поля в системе хлопково-зернового севооборота являются источником зимовки и формирования состава фитофагов, кроме того служат также их естественные соседи и другие полезные насекомые, которые играют важную роль в формировании энтомофауны хлопчатника и зерновых культур.

Ключевые слова: *формирование, энтомофауны, системе сева, хлопково-зерновых, чередований методы, управления численностью, вредитель, краевие обработка, энтомофаг, болезни сорняки органический метод.*

Введение

УДК.632+633.41+631

В современных глобальных изменениях в мире усиливается пресс вредителей и болезней сельскохозяйственных культур. Одной из основных причин этого считается появление резистентных популяций, нарушение биологической цепи и негативное влияние на биоразнообразие в результате большого внимания, уделяемого химическому методу в борьбе с вредителями во всем мире.

В настоящее время спрос на органические продукты в мире растет день ото дня. Мировой рынок органических продуктов превысил 72 миллиарда долларов (5 миллиардов долларов в 1999 году). США, в России Германия и Франция далеко впереди в производстве органической продукции. Узбекистан также имеет большой потенциал для органического производства. Важно разработать экологически безопасные мероприятия и на этой основе контролировать численность вредителей и болезней. Во многих зарубежных странах переход от существующей системы применения химикатов к СЗР (система защиты растений) будет способствовать внедрению органических мер.

«О дополнительных мерах по обеспечению соблюдения качества и безопасности сельскохозяйственной продукции с международными стандартами»1 представленная Постановлением Президента Республики Узбекистан от 18 мая 2020 года ПФ-5995 «Концепция развития органического сельского хозяйства и производства органических продуктов питания в Республике Узбекистан», указывается «Повышение плодородия почвы, предотвращение обезвоживания, сохранение экосистем, биоразнообразия, экологической стабильности, производство органической сельскохозяйственной продукции с зарубежными научно-образовательными учреждениями и исследования в области органического хлопка», так в 2019 году цена стоимости 1 тонны органического хлопка на рынке США будет выше, чем традиционного вида, от 155 до 225 долларов США.

В системе интегрированной защиты хлопчатника и других культур от вредных организмов агротехнический способ является наиболее оптимальным и безвредным для окружающей среды. Агротехнические мероприятия в сельском хозяйстве (правильная организация севооборота, подкормки, своевременная обработка почвы, регулярный полив перед зимними заморозками и в период вегетации, удаление растительных остатков и др.) и другие профилактические мероприятия, если они проводятся своевременно и качественно, могут не требовать применения химического метода. Без этого метода невозможно будет получить высокую эффективность от других методов.

В связи с чем данное диссертационное исследование в определенной мере послужит реализации поставленных задач представленных в Указе Президента Республики Узбекистан от 7 февраля 2017 года № ПФ-4947 «О Стратегии дальнейшего развития Республики Узбекистан» и дальнейшего развития органического земледелия в сельском хозяйстве Республики Узбекистана и других соответствующих нормативно-правовых актов. Это связано с тем, что система севооборотов в агроценозах в процессе бурного развития некоторых вредителей (особенно вредителей-монофагов) за счет экологической сукцессии не может быстро адаптироваться к новым условиям, что приводит к естественной убыли некоторых видов и естественное воспроизводство других. Обзор зарубежных научных исследований по теме диссертации. Научные исследования видов и количества основных вредителей в агробиоценозах хлопчатника и зерновых ведутся в мировых научных центрах и учреждений, в частности: Университет штата Миссисипи и Университет штата Мичиган (США), The New Zealand Institute for Plant & Food Research Limited (Новая Зеландия), Instituto Nacional de Texnoligia Agropecuaria (Аргентина), Австралийская комиссия по саранче (Австралия), Китайский сельскохозяйственный университет (Китай), Всесоюзный (Всероссийский) научно-исследовательский институт защиты растений (ВИЗР), Университет дружбы народов (Россия) , Институт зоологии (Россия), Белорусская национальная академия (Беларусь), Казахстанский фитосанитарный диагностический и прогнозно-методический центр (Казахстан), Казахстанский НИИ защиты и карантина растений (Казахстан), Институт зоологии (Казахстан), НИИ защиты растений (Узбекистан).

На основе мировых исследований о составе вредителей хлопчатника и зерновых культур, повреждений, естественных врагов, мер борьбы, применения регуляторов роста растений и использование феромонных ловушек, создания и совершенствования интегрированной системы борьбы получены следующие результаты: моделирование системы борьбы с вредителями хлопчатника (Wiley Inter Science, США), использование стимуляторов в хлопководстве (Научно-исследовательский институт хлопководства, семеноводства и агротехнологии, Узбекистан), физическая борьба с вредителями и болезнями в зерновой монокультуре (Pest Management, США, Великобритания), компьютерное моделирование прогнозирования вредителей (Wiley-Inter-Science, США), разработка комбинированных методов защиты от вредителей, использование феромонных ловушек для мониторинга вредителей (НИИ защиты растений, Узбекистан), смешивание культур на одном поле или размещение разных полей рядом друг с другом (обзор, Science Instrum, США), использование биопрепаратов в биологической борьбе с вредителями и болезнями (Ассоциация «СИББИОФАРМ», Россия), размножение и использование энтомофагов в лабораторных условиях против вредителей (Ташкентский ГАУ, Биомарказ, Узбекистан). Кроме того, посадка устойчивых сортов, устраняющая необходимость в химическом контроле с использованием высокоуровневых агрономических мероприятий и методов подкормки (Новожилов, Шапиро, 1974; Дунин и др., 1981), оставляющая то, что можно, также должна была проявлять возможность жизни полезным насекомым.

В современной системе земледелия наблюдается резкое сокращение посевов люцерны, которая является рассадником полезных насекомых в системе севооборота, переход на систему севооборота и резкое увеличение посевных площадей под зерновыми, изменение оросительных систем, повсеместное использование регуляторов роста в уходе за растениями. Дальнейшее совершенствование системы сохраняет как научное, так и практическое значение.

ЗАДАЧИ ИССЛЕДОВАНИЯ: Данное исследование направлено на решение проблем данной тематики, по формированию энтомофауны в системе хлопкового севооборота и разработке методов борьбы с вредителями хлопчатника и борьбы с численностью вредителей хлопчатника в связи с чем были поставлены следующие задачи:

- изучить формирование энтомофауны в условиях системы севооборотов и расширения площадей повторных культур;
- оценка влияния системы севооборота на развитие вредителей;
- определить влияние боковой обработки хлопчатника на зараженность сосущими вредителями;
- эффективность применения новых форм водно-стабилизированных серных суспензий против паутинного клеща;
- определить действие веществ, регулирующих рост и развитие растений (на основе гуминовых кислот), на энтомофауну;
- оценка эффективности новых типов ловушек насекомых при мониторинге вредителей;
- боковая обработка хлопчатника от сосущих вредителей, применение суспензий стабилизированной серы против клещей, определение экономической и экономической эффективности применения новых типов ловушек насекомых и биостимуляторов

МЕТОДЫ ИССЛЕДОВАНИЯ: В исследованиях учитывались вредные и полезные членистоногие на хлопчатнике и зерновых культурах, сорняках вокруг полей и промежуточных культурах. (Фасулати, 1961; Палий, 1970; Успенский, 1973; Ходжаев, 1994, 2018; Нурматов и др., 2007). Эффективность серных взвесей и других препаратов определяли на основании методик К.А.Гара (1963, 1967), Ш.Т.Ходжаева (2004) и В.Аббота (1925); хозяйственную и экономическую эффективность рассчитывали по методикам А.Ф.Ченкина (1979) и Ш.Т.Ходжаева (2004). Статистическую обработку результатов исследования определяли по методике Б. Доспехова (1985) в программе «Excel 2010 и Статистика 7.0 для Windows». с 95% доверительным интервалом.

РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЙ. В сельском хозяйстве переход на систему севооборота и внедрение интенсивного земледелия, в свою очередь, требует разработки современных методов борьбы с вредителями, болезнями и сорняками, так как каждая культура имеет свою энтомофауну и состав вредителей. В 2015-2020 гг. проводились научно-исследовательские наблюдения в агрофитоценозах хлопчатника и зерновых культур в районах Самаркандской области (Пастдаргом, Акдарья, Иштихон, Поярик и др.) по определению распространения насекомых энтомофагов баланса видов и очаги их образования. Наблюдения продолжались с начала марта до конца августа. Для этого осмотривались сорняки вокруг полей и растущие на полях. Для миграции насекомых использовались феромонные и сиропные ловушки для насекомых. Стационарными и маршрутными научными наблюдениями, изучали систему смены хлопково-

зернового севооборота в хлопководческих районах Самаркандской области (Акдарья, Пастдаргом, Поярик и др.) и зерновых хозяйствах (Самарканд, Тайлак, Джамбай и Булунгур), в частности фитофагов и энтомофаговна сорной и основной растительности. На сорной растительности возле посевов зерновых и зерновых культурах основными вредителями являлись: крупная хлебная тля (Schis graminium Rond.), пшеничный трипс (Haplothrips tritici Kurd.), вредный долгоносик (Eurogaster integriceps Put.), слизень (Lema melonopus L.), гессенская муха (Mayetiola destructor Say.), шведская муха (Oscinella frit L.). потенциальными видами вредителей являются: ячменная тля (Schizaphis gramium Rond.), кукурузная тля (Rhopalosiphum padi L.), остроголовая черепашка (Aetia furcula F.), кукурузная бабочка (Ostrima nibitalis HB.) и другие. Среди основных вредителей сорняков вокруг хлопкового поля и хлопчатника отмечены: паутинный клещ (Tetranychis urticae Koch.), хлопковая (бахчевая) тля (Aphis gossypii Glov.), табачный трипс (Thrips tabaci Lind.), большая хлопковая тля (Acyrthosiphon gossypii Mordv) люцерновая (акациевая) тля (Aphis medicaginis crassivora Koch.), цикады (Cicadidae), люцерновый клоп (Adelphocoris lineolatus Goeze.), полевой клоп (Lygus pratensis L.), хлопковая совка (Heliothis armigera Hb.), озимая совка (Ag. et Schiff.), из потенциально опасных вредителей: чаще встречались хлопковая белокрылка (Bemisia tabaci Genn.), карадрина (Spodoptera exigua Hb.) (табл. 1).

Таблица-1. Встречаемость вредителей хлопчатника и полезных насекомых в источниках формирования и распространения хлопчатника в системе севооборота (Самаркандская область, Акдарьинский район, 2015-2020 гг.)

№	Виды насекомых	Встречаемость доминантных видов,				
		На хлопчатнике	На основной растительности			На сорняках возле поля
			Маш	Картошка	Кукуруза	
Вредители						
1.	*Бахчевая тля - Aphis gossypii Glov*	+++	++	++	++	+++
2.	*Акацивая тля - Aphis crassivora medicadinis Koch*	+++	+++	+	++	+++
3.	*Большая хлопковая тля - Acyrthosiphon gossypii Mordv*	++	+	+	+	++
4.	Паутинный клещ - *Tetranychus urticae Koch.*	+++	+++	+	++	+++
5.	Табачный трипс - *Thrips tabaci Lind*	+++	++	+	++	+++
6.	Люцерновый клоп - *Adelpocorius Lineolatus Goere*	++	+	+	+	+
7.	Полевой клоп - *Lugus pratensis L.*	++	++	+	+	++
8.	Хлопковая совка - Heliothis armigera Hb.	+++	++	-	+++	++
9.	Озимая совка - Agrothis segetum Den. et Schiff.	++	++	+++	++	++
10.	Карадрина - Spodoptera exidia HB.	+	+	+	+	+
11.	Хлопковая стеблевая моль - Platiedra subcinerea Hw.	.	-	-	+	+
12.	Кукурузная огневка - Ostrinia nubilalus Hb.	.	-	-	+++	++
Энтомофаги						
1.	Охотник серый - Nabis ferus L.	++	+	.	++	+++
2.	Простой антакорис - Anthocoris nemorium L.	+	+	++	++	++
3.	Клоп Ориус - Orius Niger Woef. O.Albidiprenis. Reut.	++	++	++	++	++
4.	Клоп Дераекорус - Deraecoris Punctilatus Schiff.	++	+	+	++	++
5	Стеторус точечный-Stethorus punctillum Weise	++	++	+	++	+++

6.	Клеще ядный трипс - Scolothrips acariphagus Jake.	+++	++	+	++	+++
7.	Жужелищи - Carabidae	+	.	++	++	+++
8.	Божья коровки - Coccinellidae	++	++	++	++	+++
9.	Бракониды - Braconidae	.	.	.	+	++
10.	Паразиты тлей - Aphididae	+++	++	+	++	++
11.	Мухи журчалки- Sirfphidae	+	+	+	++	+++
12.	Галлицы - Cecidomyiidae	+	+	+	+	++
13.	Apanteles telengae tobias (A. Congestus)	+	.	++	++	++
14.	Златоглазы-Chrysopidae	++	++	++	++	+++

Обозначения: + - мало встречаемые; ++ - средневстречаемые; +++ -много встречаемые; . – очень мало встречаемые; - - не встречаемые.

Однако в хлопковом агробиоценозе на хлопчатнике, зерновых культурах и сорняках встречаются все насекомые: азиатская саранча (locusta migratoria migratoria L.), мароккская саранча (Dociastaurus maroccanus Thnb.), итальянская саранча (Calliptatus italicus L.) полевой сверчок (Acheta Deserta Pall.), бордосский сверчок (Tartarogryllus Latr.), туркестанский щелкун (Agriotes metuculosus Cond.). Однако вокруг поля в дикой природе проживают многие виды энтомофагов, в том числе кокцинеллиды-Soccinelidae, златоглазки-Chrysopidae, мухи журчалку-Syrphidae, паразиты тлей (Aphidiidae), представители стеторусов (Stethorus punctillum ois, Stetorus punctillum Weise. Ruet., Orius niger Wolfi., Orius minufucus L.), хищных трипсов (Scolothrips Jakh.), (Carabidae), паразитических насекомых-энтомофагов и пчел (яйдокчи пардақанотли паразит энтомофаглар ва асаларилар нинг), также установлены источники накопления и распространения.

Ввиду вышеизложенного в борьбе с вредителями рекомендуется использовать безвредные для энтомофагов средства.

Промежуточные культуры играют важную роль в формировании видового энтомоценоза в системе хлопково-зернового севооборотов. В связи с этим установлено, что кукуруза, маш и картофель, высаживаемые в качестве промежуточных культур под хлопчатник, являются основным источником всеядных вредителей, отличаясь лишь специализированными видами вредителей. В частности, установлено, что на промежуточном посеве кукурузы в основном составляют осенние и хлопковые совки паутинные клещи, а в случае картофеля – подземные совка (ер остки тунламлари), а на маше - в основном озимая и хлопковая совка и паутинный клещ.

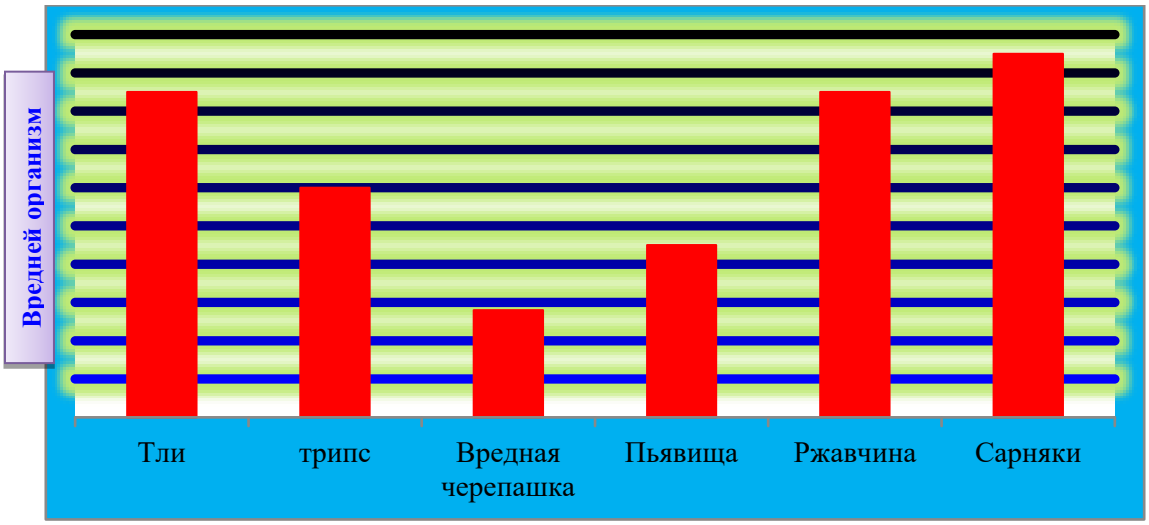

Рисунок 1. Вредители и сорняки, а также зараженность ржавчиной на зерновых полях, засеянных после зерновых (Самаркандская область, Самаркандский район 2015-2020 гг.) В этих исследованиях установлено, что в хлопковом агрофитоценозе бороться с вредителями можно только естественными органическими (агротехническими, биологическими и др.) методами в условиях, когда соотношение между фитофагами и энтомофагами благоприятно для полезных насекомых.

В четвертой главе диссертации, озаглавленной «Влияние системы хлопково-зернового севооборота на развитие вредителей» с ранней весны до поздней осени в Самаркандской области в районах Пастдаргом, Акдарья, Иштихан, Поярик Жамбай, Булунгур, Самарканд, Ургут, Тайлак и другие изучено влияние системы севооборота на развитие вредителей и возможности защиты хлопчатника и зерновых культур от вредителей, болезней и сорняков.

Установлено, что хлопково-зерновая система севооборота приводит к естественному снижению вредителей. Особенно на участках, с зерновыми после хлопка в 2-3 раза ниже заболеваемость ржавчиной, в 3-4 раза ниже засоренность сорняками, а на хлопчатнике после зерновых выявлено снижение в 3-4 раза основных вредоносных вредителей и снижение развития вертициллезного и фузариозного увядания на 25-30% (рис. 1-2-3-4).

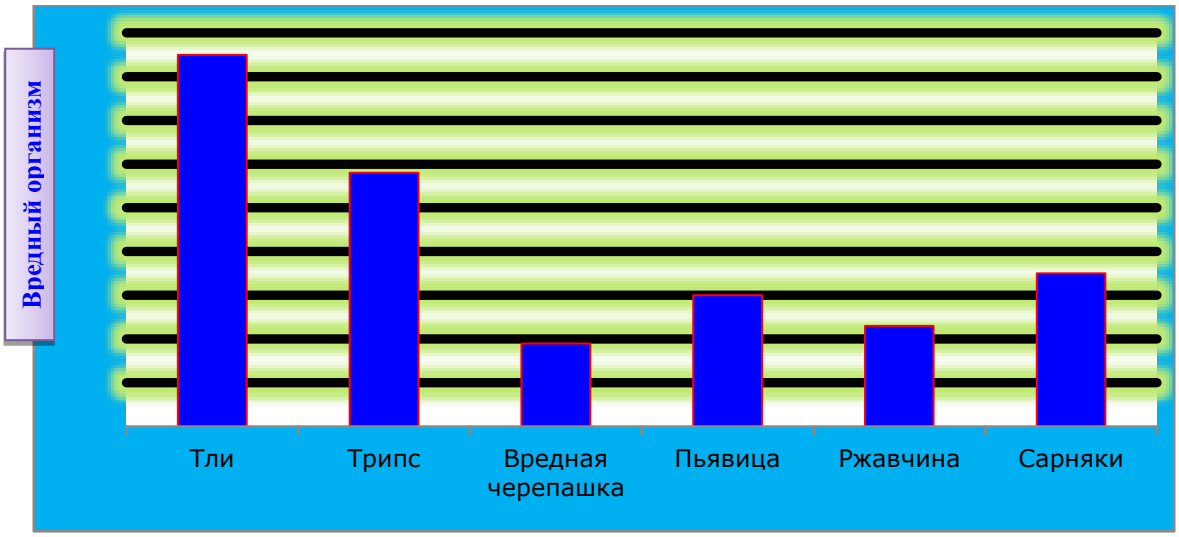

Рисунок 2. Количество вредителей и развитие болезней ржавчины на зерновом поле, засеянном после хлопчатника (Самаркандская область, Пастдаргомский район, 2015-2020 гг.)

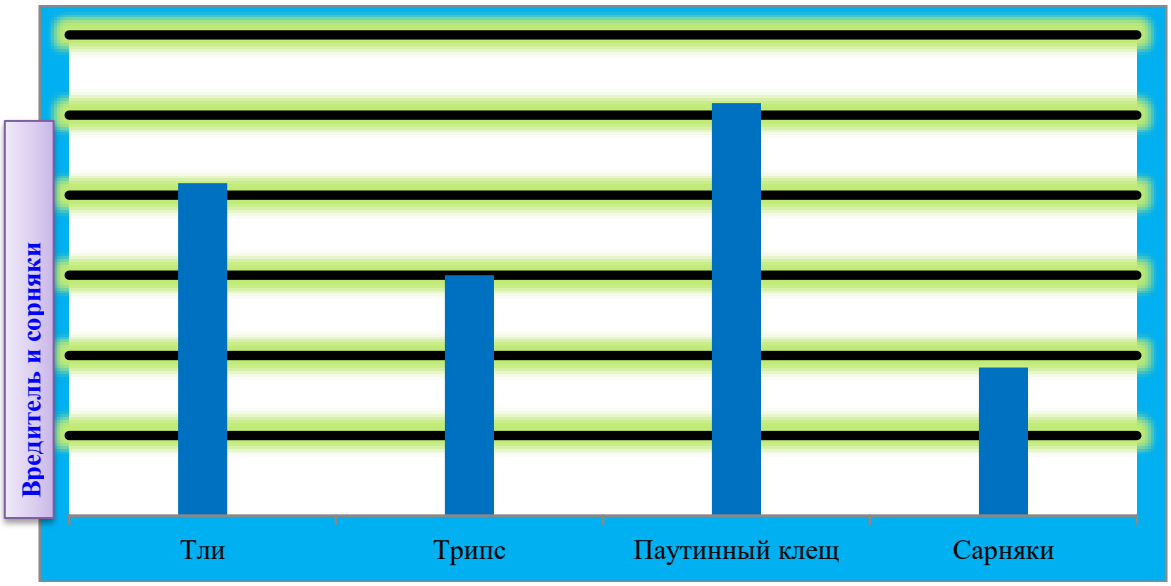

Рисунок 3. Количество вредителей на хлопковых полях, засеянных после хлопчатника (Самаркандская область, Иштихонский район, 2015-2020 гг.)

Поэтому по прогнозным данным особенно в районах где распространен паутинный клещ, рекомендуется посев зерновых культур 1-2 года, также наблюдается снижение развитие болезней при использовании данным агротехническим приемом. В целях решения проблемы овсюга и райграса, которая в настоящее время является большой проблемой в районах Самаркандской области, в основном в рядах посевов, рекомендовано засевать на таких участках хлопчатник 1-2 года. Было установлено, что при систематическом соблюдении этих мер можно

контролировать количество вредителей и снизить затраты на 60-70%. При этом загрязнение окружающей среды значительно снижается.

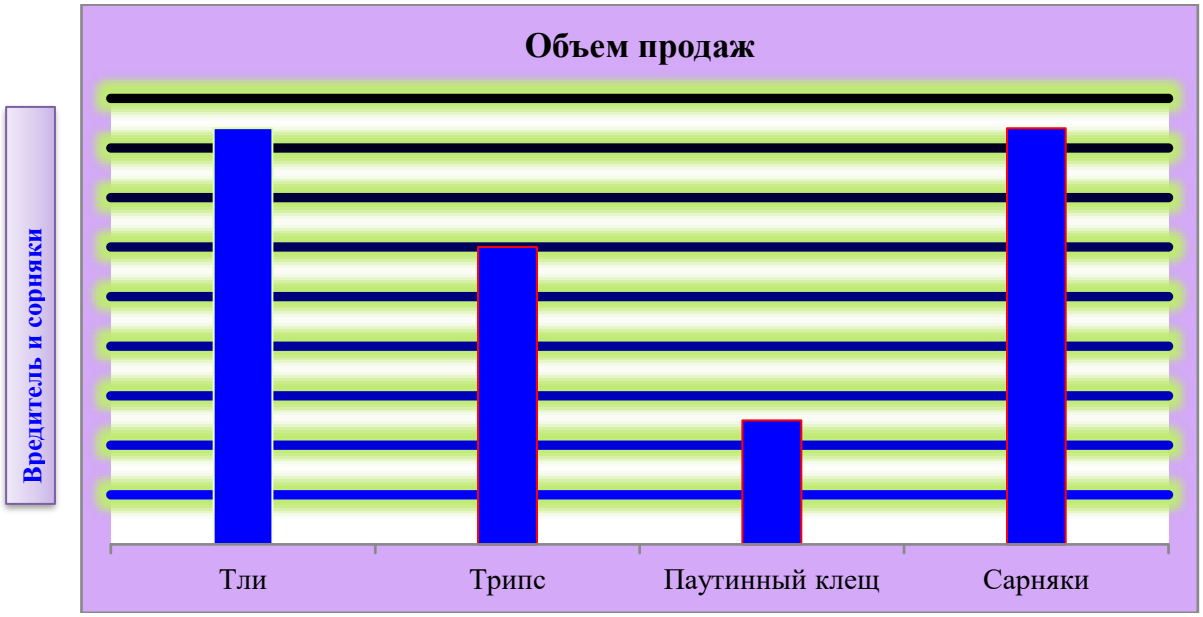

Рисунок 4. Количество вредителей и сорняков на хлопковых полях, засеянных после зерновых (Самаркандская область, Поярикский район, 2015-2020 гг.)

В пятой главе диссертации под названием «Комплексная фенологическая таблица развития вредителей хлопчатника» описывается фенология развития вредителей, значение планирования мероприятий из комплексной таблицы, разработанной на основе многолетних наблюдений за периодами поражения.

Результаты исследования показали, что на ранних стадиях развития тлей, трипсов и паутинных клещей при профилактике вредителей на 75-80% площади обрабатывают малотоксичными комплексными инсектицидами с шириной 20-30 метров от края бокового способа посадки биологическими и агротехническими приемами отмечены хорошие результаты. В ходе исследования установлено, что количественные соотношения между вредителями и энтомофагами изменились в пользу энтомофагов.

Исследования показали, что данная обработка может препятствовать распространению паутинных клещей на большие площади, обрабатывая их малотоксичным порошком серы или специальными акарицидами в виде полос шириной до 20–30 м в стороны перед прополкой. С помощью этого метода доказано, что химический метод борьбы с вредителями можно сократить и контролировать естественным путем, изменяя соотношение между двоюродным и вредным организмом в пользу первого (табл. 2).

Боковая обработка поля и биологический и агротехнический контроль за остатками снизили зараженность хлопчатника тлей на 60,4%, табачным трипсом на 48,0%, паутинкой на 39,2%.

Таблица-2. Зараженность вредителями хлопчатника при обработке почвы и влияние на соотношение грызущих и сосущих вредителей (хозяйство «Домла Аборий Умр», Иштихонский район, Самаркандская область, 2020 г.)

Варианты	Зараженность сельскохозяйственных культур контрольными (необработанными) вредителями, %	Поражаемость и химическая обработка пестицидами (инсектицид + акарицид)против тлей и трипсов, %	Снижение пораженности посевов вредителями за счет химической (добавление акарицида к инсектициду) боковой обработки краев посевов, %

Зараженность посевов тлями, %	46,1	60,4	60,4
Соотношение энтомофага и вредителя, шт.	1:161	1:89,1	1:43,6
Зараженность посевов трипсом, %	68,4	68,3	48,0
Соотношение энтомофага и вредителя, шт.	1:90,0	1:47,9	1:29,0
Зараженность посевов паутинным клещем, %	18,3	29,1	39,2
Соотношение энтомофага и вредителя, шт.	1:60,3	1:80,4	1:47,5
ЭКФ			1,8

ВЫВОДЫ

1. Отмечено, что сорняки вокруг поля в системе хлопково-зернового севооборота являются источником зимовки и формирования состава фитофагов, кроме того служат также их естественные соседи и другие полезные насекомые, которые играют важную роль в формировании энтомофауны хлопчатника. и зерновых культур.

2. Посев зерновых по зернобобовым культурам (маш) и кукурузы, которые выращиваются как второстепенная или промежуточная культура в системе севооборота, является источником образования и распространения озимой и хлопковой совки, а также паутинного клеща, а площади под картофелем - в основном источником образования и распространения подгрызающих совок а люцерна формирует развитие энтомофагов.

3. Под влиянием хлопково-зернового севооборота естественное уменьшение некоторых вредных организмов при посеве зерновых после хлопчатника и развитие ржавчины в 2-3 раза меньше и в 3-4 раза меньше засоренность сорняками (особенно овсюгом и другие злаки).

4. На хлопковом поле, засеваемом по зерновым культурам, выявлено уменьшение количества паутинного клеща, являющихся очень опасным вредителем, в 2-3 раза, а также снижение развития болезней хлопчатника (вертицеллезом и фузариозом увяданием) на 25-30 %.

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
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	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2022 **Issue:** 04 **Volume:** 108
Published: 13.04.2022 **http://T-Science.org**

Issue Article

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DEVELOPMENT OF STUDENTS' CRITICAL THINKING IN FOREIGN LANGUAGE (ENGLISH) LESSONS

Abstract: *The article discusses about the problems associated with the development of critical thinking in high school students, discusses the main techniques and strategies for its development in foreign language (English) lessons.*

Key words: *critical thinking, basic model, comparison of texts, reflection, expression of evaluative opinion.*
Language: *English*
Citation: Rustamova, Sh. A. (2022). Development of students' critical thinking in foreign language (English) lessons. *ISJ Theoretical & Applied Science, 04 (108),* 321-325.
Soi: http://s-o-i.org/1.1/TAS-04-108-39 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2022.04.108.39
Scopus ASCC: *3304.*

Introduction

One of the types of human mental activity is critical thinking, characterized by a high level of intellectual perception, understanding and an objective approach to the surrounding information field. In the conditions of constantly accelerating dynamics of life, the teacher is tasked with developing a personality that could be successful in the modern world, teaching students to work correctly with various information sources, correctly evaluate and use the information received.

Since the study of a foreign language (FL) today is aimed at developing a person who is ready for contacts with representatives of a different culture at a high level, the central task for students in studying a foreign language is to learn how to find knowledge effectively and think critically. Students should be able to perceive new information in a foreign language, carefully and critically examine it, and also be able to balance different points of view in their minds, be able to formulate their point of view on a foreign language.

The development of critical thinking has become an integral part of the modernization of the modern school in general and the optimization of foreign language teaching in particular. The relevance of this study is associated not only with a special final form of knowledge control, but also due to the practical need of society for a person with freedom of thought, which implies its critical orientation. At the lessons of a foreign language, the formation of critical thinking is carried out, first of all, through such types of speech activity as reading, writing and speaking.

Therefore, a foreign language teacher needs special attention to the development of students' critical thinking. At the same time, as practice shows, the technology of developing critical thinking is still little used in practical pedagogical activity. Teachers of foreign languages are either not at all familiar with the techniques and strategies of critical thinking, or are familiar with some of them, but do not have a clear idea of their use in all of the above types of speech activity, using them mainly in reading, writing or dialogic speech and almost not using them in monologue speech, while monologue speech special importance is attached, because, according to the program, the student should be able to describe, report, characterize and tell something, expressing his attitude [7]. In fairness, it should be noted that most teachers are still aware of the importance of mastering the techniques and strategies of critical thinking in full and are ready to study them.

Thus, the relevance of the chosen research direction is determined by the following contradictions: 1) between the need of the educational and educational process in a foreign language in the

development of critical thinking among undergraduates and the lack of proper training and the desire of teachers to master modern teaching technologies; 2) between the need to use technologies for the development of critical thinking in all types of speech activity, including monologue speech in a foreign language lesson and episodic, non-systemic use of them.

The range of problems associated with the development of critical thinking among students is very wide, the research process is quite long-term, the ultimate goal of the study is to identify the effectiveness of the use of elements of technology for the development of critical thinking of students in teaching monologue speech at the senior stage of English language teaching.

But at this stage we have limited ourselves to solving only a few tasks, namely: 1) to reveal the essence of the concept of "critical thinking" and to consider the technology of developing this type of thinking in students; 2) to identify the possibilities of developing students' critical thinking in a foreign language lesson.

In the course of solving the first problem, as a result of the theoretical analysis of psychological, pedagogical and methodological literature on the problem of the development of critical thinking, we managed to find out that:

- firstly, in the West they started talking about a holistic technology for the development of critical thinking in the mid-90s, since 1997 this technology has officially existed with the financial support of the Open Society and Coordination Institute of the International Reading Association. It was developed by the Americans Ch.Temple, K.Meredith, and J.L.Steele. There are quite a lot of supporters of the development of students' critical thinking. These include Americans D.Halpern, J.Dewey, D.Kluster.

Domestic teachers also spoke about the need to teach critical thinking: A.V.Brushlinsky, M.I.Stankin, E.D.Bozhovich and others. For Uzbek didactics, the idea of developing critical thinking is also quite new.

The stage when a person creates conditions for the development of critical thinking comes by the age of 14-16. At the same time, according to scientists, this does not mean that these skills are developed by everyone to the same degree [4; 5].

In order for a student to use his critical thinking, it is important for him to develop a number of qualities, among which D. Halpern highlights: readiness for planning, flexibility, perseverance, willingness to correct his mistakes, awareness, search for compromise solutions [10, 372].

Having considered many definitions of critical thinking, we found that with all their diversity, one can see a close meaning in them, which allowed us to deduce the following generalized definition of critical thinking - this is analytical, creative, reflexive and "understanding" thinking, this is the ability to choose the most optimal among a variety of solutions, to refute the false in a reasoned manner, to question ineffective solutions.

Secondly, the technology developed by Ch.Temple, K. Meredith and J. L. Steele for the development of critical thinking through reading and writing offers a system of specific methodological techniques that can be used in various subject areas. This is a universal, penetrating, "over-subject" technology, open to dialogue with other pedagogical approaches and technologies. The technology of developing critical thinking through reading and writing is based on a basic model consisting of three phases: the challenge phase, the implementation phase, and the reflection phase [8; 9].

Often, the lack of learning effectiveness is explained by the fact that the teacher constructs the learning process based on the goals set by him, implying that these goals were initially accepted by students as their own. At the same time, didactics develops the ideas of a constructivist approach to teaching, which implies the possibility for the student to set goals himself, creating the necessary internal motive for teaching. If the student is given the opportunity to analyze what he already knows about the studied topic, or make a decision in accordance with his experience, this will create an additional incentive for him to formulate his own goals - motives. It is this task that is solved in the challenge phase. The second task is the task of activating students. It is important that everyone can take part in the work aimed at updating their own experience. An important aspect in the implementation of the challenge phase is the systematization of all the information that appeared as a result of free statements of students [4, 24].

The stage of the implementation phase is called the semantic stage. In most classes where new material is being studied, this phase takes the longest. One of the conditions for the development of critical thinking is to track your understanding when working with the material being studied. It is this task that is the main one in the learning process at the implementation phase. In the process of implementing the semantic stage, the main task is to maintain the activity of students, their interest and the inertia of movement created during the challenge phase. Also, at the semantic stage, students continue to independently design the goals of their teaching. It is important that the teacher encourages students to pose new questions, search for answers through the context of the information with which students work. It is necessary to allocate sufficient time for the implementation of the semantic stage [4, 29].

Robert Bustrom in the book "The Development of creative and critical thinking" notes: "Reflection is a special kind of thinking... Reflexive thinking means focusing your attention. It means careful weighing, evaluation and selection" [4, 35]. In the process of

reflection, the information that was new becomes appropriated, turns into one's own knowledge. Reflexive analysis and evaluation permeate all stages of work, but at the third stage – the reflection phase – it becomes the main goal of the activity of the teacher and students. Reflexive analysis is aimed at clarifying the meaning of the new material, building a further learning route. It is in the process of verbalization that the chaos of thoughts that was in consciousness in the process of independent comprehension is structured, turning into new knowledge. In any case, the reflection stage actively contributes to the development of critical thinking skills.

Thus, at the reflection phase, students systematize new information in relation to their existing ideas, as well as in accordance with the categories of knowledge. At the same time, the combination of individual and group work at this stage is the most appropriate. In the process of individual work (various types of writing: essays, keywords, graphic organization of the material), students select the information that is most significant for understanding the essence of the topic being studied. Along with written forms, oral reflection is no less important. By resolving the dialogue at the stage of reflection, the teacher gives the opportunity to see and consider different versions of opinions on the same question. This is a time of rethinking and changes in the educational process. Questions can be an effective mechanism for stimulating reflection. Another incentive for the activation of reflection is the subjective judgments of the teacher himself. The partnership's position allows us to make the atmosphere of discussion more open. In the process of reflection, the results of students' work are evaluated.

Thirdly, within the framework of educational technology for the development of critical thinking, there are many technological techniques. By combining these techniques, teachers can adapt the lesson to a specific material and to the level of development of students. At the "challenge" stage, it is recommended to use the following techniques: pair or group brainstorming (brainstorming), drawing up "clusters" (associative fields), filling in constructive fields, maintaining a "logbook" in the lesson, etc. At the stage of "implementation", a system of marking the text "insert", tables "Plus - Minus - Interesting", "We know - We want to know - We found out" can be applied. Being at the final stage – "reflection", the teacher can combine the above-mentioned techniques, as well as turn to group summing up, discussing the results, return to the problem posed at the beginning of the lesson and check whether it has found its solution. At the stage of "reflection", the teacher can develop students' creativity by giving the task to come up with a "cinquain" (short rhyme), write an essay, etc.

As for the second task of our research, namely, to identify the possibilities of developing students' critical thinking in a foreign language lesson, the results of the analysis of the experience of domestic teachers [1; 2; 3; 6] also indicate that critical thinking, if it develops, is most often based on reading and writing, less often – speaking. However, the authors agree that strategies for developing critical thinking in teaching reading, used in foreign language lessons, can be successfully used not only in other types of speech activity, but also in other subjects. The list of these strategies includes: annotating the text, previewing, contextualization, posing questions by students, reflection, presenting the text in general terms and concise presentation, expressing an evaluative opinion, comparing and contrasting different texts with a common thematic focus. Let's consider each of the mentioned strategies.

The annotation is carried out directly on the pages of the text. It includes underlining keywords, writing comments or questions in the margins, bracketing individual parts of the text, putting forward hypotheses using lines of different colors and arrows, numbering the sequence of events, marking everything that is unusual or controversial.

Preview prepares students to understand the new text, familiarization with it before reading. This stage helps to understand its theme and structure. In this case, new information can be gleaned from the title or viewing reading.

Contextualization is the comprehension of a text within a historical, biographical or cultural context. When reading the text, students consider and evaluate events through the prism of their personal life experience, often forgetting that the text describes the events of the past and for its critical assessment it is necessary to understand the difference between modern ideas and those that were an integral feature of the "days of the past" with their system of values, morality and features. This process is called contextualization.

Composing their own questions to the text helps students to penetrate more deeply into the content of the text and better remember the material they read. Moreover, each question should be formulated independently and focused on the main idea of the text.

Reflection is the comprehension of a text on a personal level. It is recommended to make special notes in the margins of the text if its content does not correspond to the student's opinion, idea or belief.

The general outline and the concise presentation, despite the apparent identity of the formulations, imply different, albeit related, activities. The outline can be part of the annotation process. It implies an understanding of the differences between the main ideas of the text, as well as the events confirming these ideas. The concise presentation is not limited to a simple enumeration of the idea, but completely reconstructs the text and presents it in a new form, based on its creative reinterpretation, which

demonstrates a critical understanding of what has been read.

The expression of an evaluative judgment about the text is an important technique that is used to form the ability to put forward a hypothesis, draw conclusions, conclusions based on specific facts contained in the material read in a direct and veiled form in the form of a subtext. It is the understanding of the implication that is the deep understanding of the material.

Comparison of similar texts helps students to better understand their thematic features, and most importantly, learn to draw conclusions based on the use of different sources of information.

According to teachers, not only the above-mentioned types of strategies can be used in foreign language lessons, but also a whole arsenal of other aforementioned techniques and methods that contribute to the development of critical thinking at different stages of learning:

- creating clusters when introducing new topics that build an associative field, which, in fact, is a brainstorming session;

- determination of cause-and-effect relationships between the main characters, statement of conclusions based on personal interpretation;

- creating media texts, ads, writing continuation stories or your own ending;

- definition of fact and fiction, tracing the links between the content of a literary text, the student's personal experience and the real world, etc. [3, 26].

The researchers also recommend considering the development of critical thinking when teaching a foreign language and in the field of its linguistic features. At the same time, it is important to take into account language features that affect the formation of reading comprehension, and, consequently, the development of critical thinking.

The so-called "problem words" often cause difficulties for students in their interpretation, namely:

- words that have an indefinite, blurred meaning: fast, slow, much, little. For example, the word fast is understood differently by a runner and a participant in a Formula 1 race;

- words with double meanings, it will be useful for students to learn that politicians often use this technique of ambiguity in order to be understood differently by different groups of people;

- words with additional meanings. First of all, we are talking about such nouns as love, death, school, which can be associated with different concepts;

- expansion of the synonymic series, which is extremely necessary for understanding the evaluative characteristics of the characters: elegant, skinny, as well as irony, idioms, words with evasive meaning (probably), emotionally colored words [3, 27].

To conclude, at this stage of our research, we have come to the following most general conclusions:

1. The technology of critical thinking development is considered by researchers as innovation-modernization. The use of this technology in the educational process does not lead to its organizational transformation, that is, the use of this technology is quite feasible within the framework of traditional forms of education.

2. Insufficient attention is still being paid to the development of critical thinking in a foreign language lesson, especially English. Nevertheless, interest in the development of critical thinking in the field of foreign language education in our country has grown in recent years.

3. Despite this, we have not received a clear idea of whether the technology of developing critical thinking in the methodology of teaching a foreign language has been fully developed, including a narrower aspect – monologue speech.

4. In the process of developing critical thinking in a foreign language lesson, it is important to take into account the linguistic aspect.

In the future, we plan to develop and test a program for the development of critical thinking of students at the senior stage of teaching monologue speech in English at universities in Samarkand and to refract it in relation to the English language course at the Faculty of Foreign Languages.

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
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SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2022 **Issue:** 04 **Volume:** 108
Published: 14.04.2022 **http://T-Science.org**

Issue Article

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INNOVATIVE PROJECTS IN THE CURRICULUM

Abstract: *Actual implementation of innovation in the classroom goes a long way. However, from the point of view of the university, the intervention of scientific understanding and requirements in the content of a specific educational plan is a long process. Innovations in the daily life of the school can never be associated with a great revolution, because it threatens the existing norms and practices, and this leads to sharp criticism of the work done so far. In any case, the content of a clearly defined innovation must be known, but for now it is possible to determine only the part that is responsible for it. So far, there is very little chance for a very wide dissemination of experience and innovation. Most of the school-pedagogical reforms are innovations, promoted in very ideal and optimal projects, frustrating teachers and, therefore, intimidating and motivating.*

Key words: *innovations, school, educational institution, curriculum, teacher, innovative projects.*
Language: *English*
Citation: Muslimova, O. S. (2022). Innovative projects in the curriculum. *ISJ Theoretical & Applied Science, 04 (108),* 326-330.
Soi: http://s-o-i.org/1.1/TAS-04-108-40 ***Doi***: https://dx.doi.org/10.15863/TAS.2022.04.108.40
Scopus ASCC: *3300.*

Introduction

Innovative projects in the curriculum remain meaningless and incomprehensible if they are not professionally specified, visualized and operationalized. They also meet in the extended professional activity project. It is also necessary to address the impulses associated with the disciplines and show the way forward, which is important step by step. At the same time, there may be ideas when the chances of pedagogical innovation circulating are appropriate.

Innovative projects in the curriculum

Ever since schools have existed, planned innovations or reforms have been used as a means of propagating changes in school practices to accommodate changing living conditions. Curricula are the best example of planned innovation. These implementation measures have not always been successful, they are simply a balance of experience in this area. Fullan noted that in order to give reforms a chance, many conditions must be met simultaneously. For example, it is not enough if only new materials or curriculum are assigned. This should include other teaching methods, other organizational aspects and didactic key points. Actual implementation of innovation in the classroom goes a long way. However, from the point of view of an educational institution, it is a long process of scientific understanding and requirements that affect the content of a particular educational plan.

During training, a wide range of lesson options are covered, classified and evaluated by various educators over a long period of time in the sixth stage of training. It describes the role of innovation in the curriculum, where innovation is possible and limited, and what factors are necessary and difficult to implement. Classification patterns are checked to see if this can lead to a change in the location of innovations. Within the framework of quality education, the field of research is developing. The term "innovation" usually leads to fundamental innovations in associations in the application of a common language. Theoretically, the concept of innovation was applied as the integration of this process in the economic system with products and equipment.

It has been used in pedagogical discussions since 1960 and has become widespread in Germany in a short time. It quickly spread here and suppressed the

same expressions such as innovation, reform, school experiment or pedagogical experiment. To date, there is no generally accepted definition of the study of innovation in the economy of origin. Only on the basis of a synthesis of various definitions can we firmly stand on the following points: "Innovation is a way of obtaining new types of products that are significantly different from the situation ahead."

Innovation must be consciously mastered. Producing real ideas is not enough, and sales and use distinguish innovation from investment.

It is not enough for a new idea to refer to all these definitions to explain this innovation.

Innovations are often unpredictable or unplanned; on the contrary, innovation processes in the process of exchange are characterized by their complexity, uncertainty, degree of innovation and conflict.

As a result, the evaluation of innovations must be measured subjectively. “From a psychological point of view, innovation is the successful result of the creative potential of competent human activity.” (Baich-1997).

Thus, innovation, like a creative phenomenon, is realized in the changing relations of only one system, and they consist of a special aspect of the sphere of influence of the individual, the social circle. The evaluation of innovations must be heavily influenced by culture and time, often with favorable power structures and legitimate marketing of ad hoc situations arising from certain situations.

According to Wingens, innovation is defined in two main ways; one is result-oriented (result-oriented) and the other is process-oriented (process-oriented).

According to Reinman-Rothmeier distinguish:

- product innovations, that is, the solution of new technical problems.
- process innovations in the sense of solving work and methodological processes
- Structural innovations in terms of solving new organizational challenges
- social innovations in terms of solving new social problems

Although innovation often refers to many types of innovation, their sequence is not always as clear as possible. When a process-oriented definition is used as the basis, the direction of innovation becomes decisive. According to Hauschild, innovation begins with the construction of an already solved problem, followed by the emergence of ideas, opinions, judgments or solutions. Finally, innovation must be implemented. The result of the innovation process is the transfer of innovation into experience and skills.

Already in the early 1990s, the exclusion of certain subjects from the school curriculum was recognized.

“In addition to organizational development, the real thing is lessons, upbringing and education. Again, the goal is to further improve the development of the school, that is, to improve the achievements and qualities of the school” (Schratz 1995, 269). Previous research has shown that curricular innovations tend to be distributed across lessons.

It has become clear that innovations in the daily life of the school can never be associated with a great revolution, because they threaten existing norms and practices, and this leads to sharp criticism of the work done so far. In any case, the content of a clearly defined innovation must be known, but for now it is possible to determine only the part that is responsible for it. So far, there is very little chance for a very wide dissemination of experience and innovation. Innovations that promote many school and pedagogical reforms in very ideal and optimal projects disappoint educators and therefore have an intimidating and motivating effect.

Another aspect is the extent to which curricula clarify and articulate the objectives of the update, emphasizing priorities and background and, in their own sense, describing them to teachers. At the same time, it has a very positive effect on teachers, if you specify where the relief and relief are. In this regard, the content and practical placement of curricula can help to accelerate the understanding of specific instructions and examples and eliminate fear. In addition, restrictions on related requirements can eliminate advice and suggestions on the one hand, and misunderstandings and uncertainties on the other.

At the same time, the curriculum should be open to its own formation: Methodological recommendations and curricula are most suitable when not only the smallest dimensions are formed, but also the main goals and broad subject areas are separated by clearly defined requirements. Not only do they limit the abundance of material, but they also limit the pressure on teachers, give them a sense of confidence in their main job, and generally give them the opportunity and conditions to follow their own creative and appropriate student routes.

Innovation is only as effective and achievable as understanding and personal influence on the development process allows the participation of stakeholders. Various activities, including meetings, reviews, intra-school conferences and improvements, and online surveys, should be activated and shared throughout the development period. The purpose of these activities is to inform teachers at the beginning of the renewal period, inform them about the current state of development and involve them in the development process.

If the relevant subjects are "transferred" and made more understandable, there is a greater chance that renewal will occur in everyday school life.

If teachers are taken seriously and confidence is built, subjects take their place, Heinisch says, and both conditions make it easier to accept and finally identify pedagogical and other innovations. Innovative projects in the curriculum remain meaningless and

incomprehensible if they are not concretized, visualized and put into action. They also meet in the extended professional activity project. It is also necessary to address the impulses that are related to the disciplines and point the way forward, more importantly step by step. At the same time, the cycle of pedagogical innovation takes time; Heinisch distinguished several time periods: the most difficult moments for the introduction of innovations and the most favorable moments for the adoption of new pedagogical guiding ideas, for example, when schools themselves have already thought out the appropriate directions.

Holtappels, on the other hand, speaks of an "equal weight paradigm" in relation to the "right time" change.

A balanced school system can be hindered by external factors and internal organizational problems. The call for change in this case leads to dissatisfaction or deterioration in the work of school members, and certain situations or phenomena are no longer tolerable or considered beneficial. These mental states or their consequences (eg, student failure, unaccustomedness, reduced parental support) may lead to the need for change, which again may create "equal weight" (i.e., the quality of a coherent school). Along with the overlapping analysis of the factors hindering the innovation process, we can talk about the communicative development of a new direction in the revival of weight. (Holtappels 1995, p. 38)

The concept of current innovation.

Innovation in the traditional sense has a decisive influence on individual ideas. The interpretation of innovation is always associated with radical revolutionary changes. Innovations in the modern concept of innovation are on a par with the changes that make up this revolution. In this case, the consequences of innovation should be dramatic and noticeable. Also the innovation initiative today is dominated by the fact that everyone innovates in concept. "Furthermore, the motto 'New Creativity' refers to refining existing concepts of contemporary innovation in such a way that new and lasting changes are made" (Reinman-Rothmayer 2003, 11).

Signs of didactic innovations

The economic and scientific definition of didactic innovations is described, based on the following features:

“Didactic innovations are innovations of the organization, as well as the method and content of education, which affect the result of the initiated changes in the educational process and significantly change the transfer of knowledge. In this sense, in order to restructure the process of teaching and learning, teaching and learning organizations also need new teaching and learning content, methods or framework constraints, where these three requirements should in no way depend on each other. An example of this is the transformation of curricular reforms into didactic innovations, and if we fulfill the above conditions, then it will be possible to speak more precisely about curricular innovations.”

New methods of learning and teaching have a direct innovative impact on education, which makes the didactic innovation a social innovation at first glance, and solves a certain problem of education or teaching and learning with didactic changes. In general, didactic innovations can be attributed to other types of innovations. Didactic innovations can also influence, for example, teaching strategies and thus become an innovative process. The implementation of didactic innovations has a structural-variative effect, resulting in structural innovations. If innovations are primarily based on new developments, such as new information and communication technologies, then we can talk about product innovations.

School structure and innovation

Encouraging, promoting and accelerating innovation is an important step towards their success. The pedagogical-organizational, self-renewing ability of any school, especially the teaching staff, depends on the innovative potential, personal development within the school and, above all, on the pedagogical leadership of the school leadership.

Development of a positive innovation climate at school

One of the important features of the usual understanding of organizations is the independence of the individual and the consistency of instructions in the sense of the bureaucratic model. Here the service instructions lead to a categorical sequence of innovations; school change is achieved through the introduction of management, for example, a new basic level for the subject. The effectiveness of implemented innovations is substantiated in rational-experimental strategies, so the reasons for innovations are both reasonable and promising.

“Managerial and rational-practical strategies have certain limits in school innovations, and in most cases they are controversial when they become operational, so innovations must be classified according to their value, motivation and experience, abilities, skills and focus. If the school administration plays a decisive, impulsive role at this time, innovation has only one chance at the school. One type of this is the accumulation of innovations in the sense of psychological support, which is accepted by teachers with confidence and seriousness with the encouragement, treatment and respect of the school administration. On the other hand, in order to understand leaders as giving ideas, impetus, and also accelerating the development of demand, it is necessary to pay attention to the development of innovation through the board. In connection with the existing powers of the Board, it is important that they be accepted and developed by colleagues, taken for

their own verification. At the same time, dynamic development should be so widespread that other teachers should be involved, as they can learn about innovations from their own experience.

The most consistent goal of management is to create an inclusive culture of learning in the school. This allows teachers to experiment, open up new perspectives in the classroom, learn about alternative methods and thus achieve a better understanding of innovation. Such a culture of cooperation and learning must be created not only by paving the way for a settlement, but also in many areas of information. These conditions are already aimed at the formation of a general positive innovative climate by the school and the leadership (mobilization of forces specific to the school, creation of a structure of communication and cooperation).

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Encouraging, promoting and accelerating innovation is an important step towards their success. The pedagogical-organizational, self-renewing ability of any school, especially the teaching staff, depends on the innovative potential, the development of the personality of the school and, above all, the pedagogical leadership of the school.

Development of a positive innovation climate at school

One of the most important features of the generally accepted understanding of organizations is the independence of the individual and the sequence of instructions in the sense of the bureaucratic model. Here service instructions lead to categorical tracking of innovations; changing schools is achieved by introducing into management, for example, a new basic level in the subject. The effectiveness of imported innovations is based on rational-experimental strategies, so the reasons for innovation are as reasonable as they are promising. “Managerial and rational-practical strategies have certain limits in school innovations, and in most cases they cause controversy when they come into operation, so innovations need to be classified, so to speak, appropriately. If the school administration plays a decisive, impulsive role at this time, then innovation has only one chance at the school. One of these is the accumulation of innovations in the sense of psychological support, which is perceived by teachers with confidence and seriousness in the encouragement, attraction and respect of the school administration. On the other hand, in order to understand leaders as everyday ideas, impulses, and to accelerate the development of demand, it is necessary to pay attention to the development of innovation through the board. Because of the Board's powers, it is important that they be accepted and developed by peers subject to their own scrutiny. At the same time, dynamic development should be more widespread, to which other educators should be involved, although they may learn about innovations from their own experience.

The most important goal of management is to create an inclusive culture of learning in the school. This allows teachers to experiment, open up new perspectives in the classroom, learn about alternative methods and thus achieve a better understanding of innovation. Such a culture of cooperation and learning must be created not only by paving the way for regulation, but also in many areas of information. These conditions are already aimed at creating a generally positive innovation climate in schools and leadership (mobilization of specific forces for schools, creation of communication and cooperation structures). If we talk about the culture of mistakes, then tolerance in the council plays a very decisive role, and they allow you to talk about personal problems without damaging your reputation.

Innovative Lesson Plan Projects

According to the author, the curriculum is most appropriate when it is not only the smallest in size, but also with clear requirements for the main goals and broad subject areas. This is not only a lack of material, but also a pressure on students, they also create a sense of confidence in their main work, and they are usually given opportunities and conditions to follow in their own creative and relevant relationships. The emergence of understanding and personal influence in the process of development and innovation is much more effective when it allows participation. Various activities, including classes, case studies, school conferences and updates, and online surveys, should be integrated with an intense exchange of ideas throughout the development period. The purpose of these activities, as described by the author, is to educate their teachers early in the learning cycle, inform them of the current state of development, and integrate them into the development process.

Conclusion Even under the favorable conditions noted above, the situation with innovations in such schools is generally not easy. Heinisch said: “There are many developing effects, but they could weaken sustainability again. For example, such innovative developments are under pressure and may even be the result of inattention. If the main parts of the school system are becoming more traditional, the main pedagogical ideas are essential for the curricula. Incisions in the area of the auxiliary source also have a developmental delay and limit motivation. Finally, there are difficulties arising from the didactic thinking of teachers, until then self-justifying habits are staged and have a strong influence and only gradually change. Taking all this into account, we can conclude that innovations are set for the long term, developed by new models of didactic thinking with great patience, great support and tolerance, inspiration and examples. These conditions are already aimed at the

formation of a positive innovation climate by the school and the leadership, the dissemination of innovations in the school depends mainly on the mood of the school, the norms and culture of government, the spirit of the organization.

Summary

In this article the author deals with the suitable moments for the curriculum and shows that for this, not only the least formed nuasures, but also main objectives and large topic areasshould be coordinated. Not only the abundance of materials but also the pessure on the teachers is limited by this and also confidence is made in their main work and generally opportunies and conditios are given to them to go on their own creative ways and on the ways belonging to different students.

In the process of developmend when the formation of understanding and adoption of the individual influence and the presence of belongigs are realised, the more effective the innovation becomes and is achieved. Different activities and also meetings, viewpoints, conferences at the school and improvements, internet surveys should be brought into activity with intensive opinion exchanges during the period of general development. The aim of these events schich the author deals with is the sensitivity at the earli stage of innovation, to inform about the actual situation of progress and to integrate into the process of progress.

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Impact Factor:					
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	GIF (Australia) = 0.564	ESJI (KZ) = 8.771	IBI (India) = 4.260
	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2022 **Issue:** 04 **Volume:** 108
Published: 15.04.2022 **http://T-Science.org**

Issue Article

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THE TEXTBOOKS AND LITERATURE BY AQOID WHICH WAS TAUGHT IN MADRASAH OF MOVAROUNNAHR

Abstract: *This article deals with the science of kalam and the textbooks and additional literature taught in the madrasas which was operating in Movarounnahr region in the early 19th and 20th centuries. Important information is provided about which textbooks and literature students have read on theology which was depended on their stage of learning.*

Key words: *Movarounnahr, madras, the science of kalam, obligatory duties, the fundamentals of religion, aqeedah, paith, a four-volume book, an issue of shariat, mutaliza.*

Language: *English*

Citation: Primov, S. U. (2022). The textbooks and literature by Aqoid which was taught in Madrasah of Movarounnahr. *ISJ Theoretical & Applied Science, 04 (108),* 331-335.

Soi: http://s-o-i.org/1.1/TAS-04-108-41 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2022.04.108.41

Scopus ASCC: *3300.*

Introduction

The scholars from Movarounnahr have made a great contribution to the development of world civilization. Their works and contributions are great, especially in the Islamic subjects and sciences. Abu Mansur Moturidi who was the founder of the doctrine of Moturidi and one of the two doctrinal direction of "Ahli Sunnah wa'l-Jama'ah, was born in this country and made many disciples and wrote many works. Also the scholars of the later period did significant work in this regard. That is, they rejected the various heretical sects and currents of their period and wrote a lot of works on the subject in religious matters.

In Movarounnahr, a unique tradition and school of teaching Islam to students and conveying to them the true essence of Islam have been going on for over ten centuries. The madrassas in Samarkand, Bukhara and Khiva have played an important role in this regard. Muslims in other countries also acknowledge that the religious education system in madrassas of Movarounnahr is well established and has achieved good results. It is difficult to say exactly when madrassas were built in Muslim countries. Madrasas were widespread in countries where Islam was believed in the ninth and thirteenth centuries, including Central Asia. Some scholars mentioned that the first madrasah was built in Bukhara in the 10th century. According to the writings of scholar Narshahi, the Forjak madrasah was one of the first madrasas in Central Asia, which was damaged in a fire in 937 [1: 161].

There were some types of madrasas such as khan madrasas, eshan madrasas, private madrasas. The founders of the madrasah allocated a special property - a waqf for the financial support of the madrasah and appointed a trustee to manage this property. Part of the income of waqfs of madrasas is allocated for the maintenance of waqf property, repair of madrasah building, a certain part is given to mutawwali, mudarris, students, imam of mosque , muezzin, barber, cleaner and other servants.

According to Hasankhoja Nisari, who lived in the 16th century, Sayful ulama Kamoliddin Ibrahim Shirvani taught in Bukhara, which was the pride of cities for some time and all of his mature students achieved the level of Mawlana.

Bukhara madrassas are one of the centers of education that great teachers were prepared in it . The following words of Mahmud ibn Wali, who lived in the 17th century, prove the role of Bukhara as a center

of education: "Because of the large number of scientists, it is called the source of scientists and science," he wrote.In the 1840s, the Russian tourist N.Khanikov mentioned that there were 103 madrassas in Bukhara on the Amir's list, 60 of which were the largest. The most famous of them were Kokaldosh, Ulugbek, Zargarlar, Tursunjon, Khiyobon, Govkushan madrasas and others.

The english tourist A. Burns pointed out that there are 366 large and small madrassas in the city, and that students of madrassas were from all countries except Iran. They had noted that they would complete a seven- or eight-year training course and return to their homeland with a stockpile of knowledge.

According to information of the 1920s, there were about 3,000 Russian Tatars in Bukhara, 300 of whom came to study Islamic principles. At the end of the 19th century, there were about 170 large and small madrassas in the emirate, serving about 10,000 mullahs, mudarris, imams, and clerics who had the right to issue fatwas against any action of the Ruler. The madrasas were economically independent and they had huge endowment properties with an income of about 5 million coins.

The madrassas had a large endowment property, the proceeds of which were used to pay salaries of the teachers and scholarship of the students. One of the Mudarris had to control the expenditure of the proceeds. A priest who successfully passed the annual madrasa exams would receive a lifetime scholarship. In the middle of the 19th century, the number of madrasah students in Bukhara increased from 9,000 to 10,000 members.

Therefore, by the end of the 19th and the beginning of the 20th centuries, Muslims living not only in Central Asia, but also in various parts of the Russian Empire, Kashgar, Afghanistan and northern Iran, sent their children to Bukhara madrassas for education. This situation lasted until the 1920s. According to the words of Sadriddin Aini, Bukhara madrassas have a high reputation in the Islamic world and the words of the scholars educated in them on religious issues are considered more authoritative than those of who studied in Egypt and Hijaz.

Depending on the level of knowledge of students studying in madrassas operating in the region, certain books and works from basic Islamic disciplines such as aqeedah, fiqh, tafsir and hadith are taught as basic textbooks. The madrassas that were operating at that time taught the students at three levels - primary, secondary and tertiary. Certain subjects and sciences were taught at each stage. At the initial stage, the students were taught by literature which was written in Turkish and Persian languages.

As the science of Aqeedah is the most important science, it is given a lot of attention in madrassas. In particular, the work "Farzi ayn" by Abdulvahid Bukhari was taught as a textbook which was written in Persian. This pamphlet was taught as a textbook in primary madrassas in the Central Asian region in the late 19th and early 20th centuries. The book is memorized with special attention to readers and students.

There are various opinions as to who wrote the work “Farzi Ayn”. In some sources it is said that author is unknown, while others believe it was written by Suleiman Bukhari who was scholar from Bukhara. Some scholars say that the pamphlet was written by Abdulvahid Bukhari, a well-known teacher from Bukhara. Because in one edition " his name is mentioned in the work "Farzi ayn" as secretary, compiler and publisher”. In particular, the famous writer Sadriddin Ayni also noted the same information.

In the work “Farzi Ayn” it is described the obligatory deeds of the religion that Muslims need to know and follow. It is obligatory for every man and woman who has reached the age of puberty and is conscious to do and know it. The issues that were mentioned in the play are in accordance with the sects of Imam A'zam Abu Hanifa, (may Allah have mercy on him).

The fact that this pamphlet quotes from reliable sources of the Hanafi school, such as "Fusuli imodiy", "Jomeul mutafarriqot", "Kifoyai Shabiy" that is a clear proof of our opinion.

The famous scholar of our time Sheikh Mansur said: “We heard about the work called "Fusuli imodiy" when were a child, or rather, when we memorized the work "Farzi ayn", the name of that book stuck in our memory. He later said that the book was written by the grandson of the great scholar, Burhanuddin Marghinani who was the author of “Al-Hidoya”.

Although the work “Farzi Ayn” itself is a small and concise pamphlet, as noted above, it contains important issues from reputable sources. According to the work “Saloti Mas'udi” and other jurisprudential sources, Abu Hafs Kabir Bukhari said: “"Even if a person performs the pillars of prayer well and does not know whether it is fard, wajib or sunnah, his prayer is not valid.” In order not to fall into the same situation, the work "Farzi ayn" serves as a close assistant.

The words of faith, the six religious words and their meanings, the attributes of Allah, the eight rules called the "fundamentals of religion", the forty fards, the fards of prayer, the wajibs and sunnahs, the acts that invalidate the praying, the supererogatory prayings, the etiquette of visiting the grave, and the adhan issues, Eid and funeral rules, instructions of qadha praying and marriage are briefly explained in the work “Farzi ayn”. In general, this play contains religious information that is necessary in the daily life of every Muslim [2: 3-5].

The work “Chahor Kitab”, popularly known among Uzbek-speaking peoples as “Chor Kitab”, was also taught to students at an early stage of education. In fact, the work was written in Persian. Later it was

translated into Turkish. The book, as its name implies, consists of a collection of four works. The second work in the book is devoted to religious issues and its purpose is stated as follows: “This book describes the faith, its meaning, types, rulings, pillars, conditions, and the meaning, types, rulings, pillars, and conditions of Islam, as well as the summation and separation of the meanings of faith and Islam. This will make it easier for believers and Muslims to understand, comprehend and memorize. Nevertheless, if a person does not know the conditions of faith and Islam and is not aware of the pillars and rules of faith and Islamic religious, such a person will not be called a Muslim in any sect, nation or religion [3: 16].

The second work of the “Chor Kitab” was written in a question-and-answer format, which was devoted to these primary essential religious issues. That is, a question about a religious issue is asked and then answered. For example, “If he asks how many qualities it is necessary to believe in Allah, “It is necessary to believe with ten qualities. From these ten qualities, two are negative and eight are substantive [3: 18].

After studying Arabic grammar at madrasa, students read textbooks by aqoid which was written in Arabic. In particular, the commentary of Ali ibn Uthman al-Oshi (d. 575/1179) on the poem "Al-Qasidatu al-lomiya fi-t-tawhid", that is, the work of Mulla Ali Qari "Zawul maali" was taught. Although there are few differences between the different copies of the work “Bad'ul Amali”, but it can be said that there are some differences between them. The commentary by Mullah Ali Qari on the work “Zaw al-Ma'ali”, “Tufhat al-Aali” and “Practical translation” by Humaydi contain the same 68 verses. The main information of the work is described in 60 bytes, the rest contains advice and prayers for students.

The fact that the work “Bad'ul Amaliy” is a wonderful one that has always attracted the attention of the people of science from the large number of comments written on it. Many commentaries have been written on this work, the texts of which have been memorized and believed in for more than eight hundred years [4: 45-46].

The commentary on this work which was written by Mulla Ali Qari and entitled as "Zavul maoli" has been taught in madrassas as one of the main textbooks of the subject of Aqoid. In this commentary, the religious issues that were described in the text are interpreted in a simple and fluent manner. Imam Abu Hanifa, (may Allah have mercy on him), who wrote the work “Al-Fiqh al-Akbar” and “Sharh al-Fiqh al-Akbar” which was written by the scholar Abul Muntaha Ahmad ibn Muhammad Magnisi (d. 1000/1592) were taught as the main textbook in aqoid. This work was popularly known as "Abul Muntaho" by its author’s name. This work was selected as a main textbook because a brief commentary on the work written by the founder of the Hanafi school, Imam Abu Hanifa. The ancient scholars understood the jurisprudence in a general sense. That is, fiqh, in their opinion, covers all issues of aqoid, fiqh and mysticism. In this regard, Abu Hanifa (may God have mercy on him) called his work on religious issues as "Al-Fiqh al-Akbar" (Great Fiqh).

Imam Kardari narrates as follows: Mu'tazilites deny that Abu Hanifa (may Allah have mercy on him) wrote a work on theology. Their aim is to deny the works “Al-Fiqh al-Akbar” and “Kitab al-alim val-mutaallim”. Because in these two works, many rules of “Ahli Sunnah wa'l-Jama'ah” that were regarding religious matters are mentioned. Mu'tazilites claim that Abu Hanifa was a Mu'tazilite. It is claimed that the work “Al-Fiqh al-Akbar” was written by Abu Hanifa Bukhari, a scholar from Bukhara. Their statement is a clear mistake. I have seen myself that the scholar Mawlana Shamsul milla wad-din Kardari Bazotiqini Imadi wrote these two books in his own letter and the author was Abu Hanifa. Most Mashayiks agreed with this idea [5: 8].

In the introduction to the second edition of the work “Sharh al-Fiqh al-Akbar” by Allama Abul Muntaha, thirty-seven commentaries on al-Fiqh al-Akbar have been mentioned by prominent Hanafi scholars [5: 12-18]. Among the many commentaries of the work “Al-Fiqh al-Akbar”, there are several reasons why the commentary written by the scholar Abul Muntaha is taught as a textbook in madrassas. At first, this commentary expresses the intentions of Abu Hanifa in the text of “Al-Fiqh al-Akbar”, and it is neither too long nor too short to understand the purpose. As much as possible, emphasis is placed on explaining the goals of Abu Hanifa in the mantle. It was also written using the early mentioned comments.

In this work, the religious sayings and issues are tried to be based on the verses of Quran, sunnah and the documents of intellectual evidence. This work was first published in 1367/1948 in the publishing house "Idoratul maorif an-nu'maniya" However, modern editions of the work “Sharh al-Fiqh al-Akbar”, written by the scholar Abul Muntaha, deal with the issue of faith in the parents of the Prophet (peace and blessings of Allah be upon him). والدا رسول الله صلى الله عليه وسلم ما ماتا على الكفر (Walidu Rasulullah sallallaahu alayhi wa sallam mo moto alal kufr).

In the sentence “The parents of the Prophet (peace and blessings of Allah be upon him) did not die in kufr,” the Arabic word “Mo” is omitted because it is omitted in the text. The scholar Zahid Kawsari (may Allah have mercy on him) mentions the following in this regard: “Alhamdulillah, I saw in the Dar al-Qutub al-Misriya library that two ancient manuscripts of the work “Al-Fiqh al-Akbar” where the phrase "Mo moto" mentioned in the text. Some of my friends also saw in Manidani's Shaykh al-Islam Allama Arif Hikmat library that in two ancient manuscripts, the text came with the phrase "alal fitrati." That is, "The parents of the Messenger of

Allah (peace and blessings of Allah be upon him) died in fitrat" [6: 102-103].

Many scholars believe that the copyists of the work “Al-Fiqh al-Akbar” have the opposite meaning because they dropped one of the two words "mo" in the same place in the text. Many special pamphlets and works have been written by scholars to prove that the parents of the Prophet (peace and blessings of Allah be upon him) did not die in disbelief. In particular, the title of the work "Manhur ravzil azhar sharhul fiqhil akbar" lists the names of 18 works on this topic [7: 212].

The work “Al-Aqeed al-Nasafiyyah” by Abu Hafs Najmiddin Umar al-Nasafi (461-537 / 1069-1143) and “Sharh al-Aqeedah al-Nasafiyyah”, written by Saduddin Taftazani (722-792 / 1322-1390), were also taught in madrasas. This is because the work “Al-Aqeed an-Nasafiyya” was the most authoritative text on the doctrine of Moturidiyya. The reason for writing this work is explained by the Iranian researcher Muhammad Omar Joyo. He says: “In fact, the scholar first wrote this work in Persian and called it as "Ahli Sunnah wa'l-Jama'ah." This Persian copy was narrated his student Imam Burhaniddin Margilani (517-593 / 1123-1197). In the introduction to this work, Burhaniddin Margilani writes the following: Sultan Sanjar Seljukiy and the governor of Sistan region Amir Abulfazl arrived in Samarkand in 536/1141. At a meeting with the clerics, judges and sheikhs of Samarkand, Sultan Sanjar asked the great imam and clerics, Amir Abulfazl who was the governor of Sistan province, to write a pamphlet on the faith of the “Ahli Sunnah wa'l-Jama'ah”. When the pamphlet was written, all Samarkand scholars agreed with it and asked them to sign it. Sistan Governor Amir Abulfazl then said that he would take the pamphlet to his country and punish anyone who contradicted the beliefs that contained in the pamphlet. All the imams and clerics of Samarkand who took part in the meeting agreed to this and unanimously indicated that the pamphlet was written by Imam Abu Hafs Nasafi and that they would sign it if they were ready [8: 6].

Commenting on this preface, the Iranian scholar Muhammad Omar Joya said that during the reign of Sultan Sanjar at that time, the influence and support of the Hanbalis and Karamis increased in the territories of Iran. For this reason, the governor of Sistan said to be asked the great scholars of Samarkand region to write a reliable source of faith with the same request.

The original Persian manuscript of this work of Abu Hafs Nasafi, narrated by Imam Burhanuddin Margilani, is in the collection of the National Library of Iran. It is kept under inventory number №11-13613 in the Library of the Islamic Council of Iran (کتابکانه اسلامی ایران ہمجل سور) in Tehran.

The work "Sharhul aqoidin nasafiya" by Imam Taftazani is taught as the main textbook in theology not only in the Middle Ages, but also today in the regions where the Hanafi school is widespread. In particular, in the famous "Al-Azhar" mosque in India, Pakistan and Egypt, students are taught the subject of faith as a basic textbook. The scholars of Maliki, Shafi'i and Hanafi sects who have lived in different centuries have written 97 commentaries, margins and teachings on the work “Sharh al-Aqeedin Nasafiya” by Imam Taftazani [9: 3b-4a]. The fact that even contemporaries of Sa'd al-Din Taftazani wrote handbooks and quotations which indicates that this work has been popular in the Islamic world since the author's lifetime.

In the past centuries, in the education system of Central Asia, especially in Bukhara madrassas, students read Imam Taftazani's work "Sharhul aqoidin nasafiya" by Ramazan Efendi ibn Muhammad (d. 2025/1616), Mulla Ahmad and Ilyas ibn Ibrahim Sinobi Bursawi Hanafi (d. 891/1486), Shamsuddin. Ahmad ibn Musa Khayali, Abdulhakim ibn Shamsuddin Muhammad Siyalkuti, Mulla Qasim, Kamaluddin Ismail ibn Bali Rumi Qirmani (d. 975/1567), Qul Ahmad ibn Muhammad ibn Abdussalam Hizr Shukari Hawamidi (d. 950/1543), Ahmad ibn Muhammad ibn Ahmad Ibn Yunus Shalabi (d. 1021/1612), who studied independently with commentaries and margins written by scholars such as Akhund Shaykh, Abdur-Rahman and Ismatullah [10: 95-96].

The last work to be taught in the madrasas by aqoid is the work “Sharh al-Aqeed al-Izdiya”, popularly known as Mulla Jalal. This work is a commentary on the text "al-Aqeed al-izdiya" written by Qazi Azududdin Abdurrahman ibn Ahmad Iyji (d. 756/1357). This text summarizes the basic rules of religious matters. This was the last book which the author finished and wrote in twelve days. Jalaliddin Muhammad ibn As'ad Siddiqi Davwani (d. 908/1503) wrote a commentary on this text in Jiyrun in 905/1499 and it was also the last book written by the shariah.

The work “Sharh al-Aqeed al-Izdiya” was written on the basis of many logical rules and mental rules, so the students were taught through several directions. Because students were able to understand the religious issues stated in the text and commentary using frames.

This comment has been framed by a number of scholars. In particular, Mawla Yusuf ibn Muhammad Khan Karabaghi Muhammad Shahi (d. 1030/1621) wrote the margin work "Tatimmatul havashi fi izolatil gawashi". Scholars such as Husayn Khalqali Husseini (d. 1014/1605) and Mawla Ahmad ibn Muhammad (d. 906/1501) wrote margins and quotations.

In conclusion, it should be noted that due to the well-established system of education in Central Asian madrassas and the gradual provision of textbooks in all disciplines, students have mastered all subjects. In particular, great attention was paid to the science of aqoid, taught on the basis of the most important textbooks and additional literature. The use of these

experiences in the religious education system is still effective today.

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Impact Factor:					
	ISRA (India) = **6.317**	**SIS** (USA) = **0.912**	**ICV** (Poland) = **6.630**
	ISI (Dubai, UAE) = **1.582**	**РИНЦ** (Russia) = **3.939**	**PIF** (India) = **1.940**
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	JIF = **1.500**	**SJIF** (Morocco) = **7.184**	**OAJI** (USA) = **0.350**

SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2022 **Issue:** 04 **Volume:** 108

Published: 15.04.2022 **http://T-Science.org**

Issue **Article**

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THE PECULIARITIES OF COMPARATIVE HISTORICAL METHOD AND ITS TYPES

Abstract: *The comparative historical method took shape in the last third of the 19th century. The paper is dedicated to the clarification of comparative historical method, its peculiar features and types. The works of well-known scientists associated with the development of the method as a science are discussed as well.*

Methods. The genesis of poetic thinking and style dates back to "psychological parallelism". The similarity of conditions led to the similarity of "expression", the selection of images in the literatures of remote regions differed significantly. In ancient literature remote from each other, two links corresponded to each other: "collective author" and "reality".

Results and discussions. A motive is an "indivisible unit of a plot," for "the similarity is explained not by the genesis of one motive from another, but by the assumption of common motives, which are as obligatory for human creativity as language schemes for the expression of thoughts. In this sense, a fairy tale can be as much a reflection of a myth as sediment from an epic song or a folk book. At the same time, this is the basis for typological correspondences. Experiencing the world "apart" leads to the loss of synthesis. However, there is needed a common consciousness of vital synthesis i.e. multiple feedbacks in the chain of author ↔ work ↔ reader. Dialogue, comparison, juxtaposition are among the most general principles of culture and life.

Conclusion. The principle of the equivalence of influence and perception is one of the most important ideas of modern comparative literary studies. More precisely, we talk about a single process of "impact-perception". V.M. Zhirmunsky identified two types of comparisons such as historical-genetic and historically typological comparison.

The two main mechanisms of reception can be denoted by the terms "re-construction" and "re-creation". A text lives only when it comes into contact with another text (context). This point of contact of texts is the main subject of "comparative literary studies". On the basis of any "comparison" and "juxtaposition" are the mechanisms of "identity" and "distinction".

Key words: *historical poetics, comparative literary criticism, comparison, repetition, impact, culture, genetic connection, psychological parallelism, motive, quality of relations between images, plot, dialogue, comparative studies, "ours and others", reception, aspects of reception, spontaneous generation, typological correspondences, perceiving environment, intertextuality.*

Language: *English*

Citation: Kasimova, R. R., & Ziyadullayeva, A. A. (2022). The peculiarities of comparative historical method and its types. *ISJ Theoretical & Applied Science, 04 (108)*, 336-345.

Soi: http://s-o-i.org/1.1/TAS-04-108-42 ***Doi***: https://dx.doi.org/10.15863/TAS.2022.04.108.42

Scopus ASCC: *1208.*

Introduction

UDC: 39(=512.133):811.111'25

The comparative historical method took shape in the literary schools of Russian universities in the last third of the 19th century. Academician Alexander Nikolaevich Veselovsky became its founder.

Veselovsky Alexander Nikolaevich (1838-1906) is an outstanding historian and theorist of literature, academician of the St. Petersburg Academy of Sciences, author of major research on historical poetics and the history of world literature; the scientific horizon of the researcher covered large and small cultures, folklore traditions prevailing on different continents.

A.N. Veselovsky as the creator of the comparative historical method compared epic forms and motives, novels and stories of different eras and peoples. The scientist laid the foundations for the genetic and typological study of literature, showing that "migration" and "spontaneous generation" of motives complements each other.

Scientific ideas of A.N.Veselovsky were accepted by representatives of various literary methods and schools, his historical poetics was of the greatest importance for the formation of a new method. He sees the history of literature "as the history of social thought in figurative and poetic forms". Later in the "Introduction to Historical Poetics" and in a series of university courses and articles by A.N. Veselovsky outlines a theoretical generalization of the vast material studied by him and by ethnographers, linguists and literary scholars using the achievements of the cultural-historical school. Having considered the genesis of poetic categories, A.N. Veselovsky was the first to show that they were "the essence of historical categories"[29;20-21].

A.N.Veselovsky argues that each cultural area has its own specifics of development, and therefore it is incorrect to talk about "lagging behind" or "stagnation" of non-European peoples. Comparing "parallel series of similar facts" on the widest literary material, A.N.Veselovsky looks for typological correspondences in the culture of different "races" and eras. Also he emphasizes the connection that exists between "major phenomena" and "everyday trifles".

Methods. The context of literature with its linguistic and psychological components, which provide a rich "material for comparisons" along with "Tradition", "Reality" is one of the most important elements of the "literature" system in the "Historical Poetics" of A.N. Veselovsky [30;5-31]. Since the beginning of the 80s, the theme of "Historical Poetics" has been formed. The titles of the works "From the History of the Novel and the Story" (1886), "Epic Repetitions as a Chronological Moment" (1897), "Psychological Parallelism and its Forms in the Reflections of the Poetic Style" (1899) trace the idea of the artistic word as a special sphere of the spirit, and the idea of the need to find regularities in the literature, "parallels" not only historical, but it is possible to compare series of similar facts only if there is a principle of repeatability, in general basis for comparison. Already on the material of Greek antiquity, the scientist notes that for all the historical sequence of the development of literature, "the similarity of mythical, epic, and finally, fairy-tale schemes does not necessarily indicate a genetic connection". And the genetic connection, in principle, without denying, A.N. Veselovsky finds similarities in plots in different literatures.

In the section "The Language of Poetry and the Language of Prose" (three chapters from Historical Poetics, 1898), the researcher examines the mechanism of the emergence of the simplest poetic forms, comparisons, symbols, motives that "stood outside the circle of mutual influences". These ancient elements of imagery could have arisen independently, caused by the same mental processes and the same phenomena of rhythm. The genesis of poetic thinking and style goes back to "psychological parallelism". The similarity of conditions led to the similarity of "expression", the selection of images in the literatures of remote regions differed significantly. This is easily explained by the divergence of life forms, fauna and flora. The brilliant discovery of A.N. Veselovsky consists in pointing out the similarity of the "quality of relations" between these images. The very foundations of comparison, categories and signs (movement, volitional activity, etc.) are coming closer. In a different terminological language, in ancient literatures remote from each other, two links corresponded to each other: "collective author" and "reality".

Having set himself the task of classifying the plots of world literature, the researcher nevertheless sees that it is incorrect to compare works, having clarified related plots. The most similar plots have their own moves, conditioned by the national and historical specifics of the work, and the scientific approximation of A.N. Veselovsky, a supporter of positivist philosophy, an admirer of Ten, was deeply alien. This is how the thought is born to find a motive as an "indivisible unit of a plot," for "the similarity is explained not by the genesis of one motive from another, but by the assumption of common motives, which are as obligatory for human creativity as language schemes for the expression of thoughts; creativity is limited to the combination of these schemes. In this sense, a fairy tale can be as much a reflection of a myth as sediment from an epic song or a folk book". At the same time, this is the basis for typological correspondences.

Results and discussions. Most of all, A.N. Veselovsky is concerned with the question of the relationship between "tradition", "personal "initiative", and "individual creativity". If the basic communicative scheme is projected onto the

Historical Poetics, it becomes obvious that it is not the work that occupies the central place here. The main link in the "literature" system is "forms, images, plot", self-generated or migrating. The "literature" system takes the following form:

Tradition in this case is the main work here, the fruit of the development of literature and culture. The author and the reader are predominantly engaged in communication with the "legend", which sets limits to their romanticism and impressionism. This position goes back not only to the positivist views of the academician, but also at the same time to the basic concepts of the Russian cultural world. So, in the work "From the Introduction to Historical Poetics" (1893), personal intonation is guessed. A.N.Veselovsky warns his contemporaries against experiencing the world "apart", which leads to the loss of synthesis with their own time. However, great poets need a "common consciousness of vital synthesis". In other words, a genius becomes such only if there is a stable, multiple feedbacks in the chain of author ↔ work ↔ reader.

The relative immutability of tradition and the mutability of reality limit and expand the freedom of the author's creativity. "New demands of life" suggest to the author new content for old, "ready-made" forms. For a long time, the Russian scientist is less concerned with the individuality of the artist, he is interested in "types".

A.N. Veselovsky brings together the processes of creativity and the processes of perception, distinguishing them only by their intensity. We can say that the author of "Historical Poetics" pays close attention to direct and feedback in the system of tradition ↔ collective reader. In his work "Definition of Poetry" the scientist noted that in the course of the evolution of poetry, the content changes, "... but the formal element" remains the same. The persisting "agreement of formal elements is necessary for the artist to be able to create".

According to V.M. Zhirmunsky, the creator of historical poetics is a genius. His idea is the highest achievement of literary criticism of the 19th century. More recently, I.O. Shaitanov published "Historical Poetics", "from the chronology of lifetime publications, but following the logical plan of the author, correlating with this plan what he had done". Reconstruction of the concept of "Historical Poetics" opens up the possibility of a new point to the ideas of A.N. Veselovsky, far beyond the framework of the comparative historical method.

Dialogue, comparison, juxtaposition are among the most general principles of culture and life. In the later sketches "Towards the Methodology of the Humanities" (1974) M.M. Bakhtin noted that "... a text lives only when it comes into contact with another text (context). Only at the point of this contact of the texts does the light flash, illuminating both back and forth, bringing the given text into dialogue"[2;384]. This "point of contact" of texts is the main subject of "comparative literary studies". Comparison is the most important tool for "understanding", it is widely used by hermeneutics.

The term "Comparative Literature (Komparatistika, Litterature Comparee, Comparative Literature)" indicates "comparison" as the basis of the method. On the basis of any "comparison" and "juxtaposition" are the mechanisms of "identity" and "distinction" between one's own and another's. These mechanisms are inherent in both artistic creation and scientific thinking. In creativity, the principle of "comparison" leads to the emergence of figurative meanings, ultimately associated with metaphorization and symbolization.

In science, comparison reveals the recurrence of different signs and phenomena, demonstrating their significant similarities and differences. We can say that the comparative historical method has a general scientific modeling value, containing one of the most important motives of human thinking in general.

The principle of comparison is widely used for the study of social sciences (political science, sociology, pedagogy, international law), as well as cultural studies, art studies, literary criticism and linguistics (contrastive linguistics). Based on the comparative historical method like any translation from language to language, from space to space, from time to time, from culture to culture is most directly related to the existence of a person in the sign space of culture, which has as its axis the problem of identity and difference and with function of culture".

One should consider, for example, the interaction of various arts with literature. So, D.S. Likhachev studied Old Russian literature "in its relationship to the visual arts", emphasizing that "...interpenetration" was a fact of their internal structure [21;286]. For example, A.V. Mikhailov wrote about the 'musicality' of the literature, understanding by it the tendency "... 'to compose' 'the material according to a law higher than the law of the material itself , 'lyrically 'transform the material, raise it above its literal meaning to a higher level ..."[24;346]. Thus, the "dialogue" of the arts has different levels. In a transformed form, "picturesqueness" and "musicality" are included in the structure of literary works. "Literary", on the contrary, penetrates into picturesque and musical texts. By comparing the similarities and differences of different types of arts, their specificity, and dissimilarity and, at the same time, their relationships are revealed.

In the "literature" system, the principles of the comparative historical method are used to analyze any part of the communication chain. A special area of comparative literary studies is the comparative study of phenomena belonging to different literatures. It is clear that the methods of comparative analysis are widely used to study eras, authors and works within the same national literature ("A. Beliy and

A.S.Pushkin"; "A.S.Pushkin and Old Russian Literature", etc.). For the history of literature as a science, comparative literary criticism has general methodological significance. It is believed that the subject of comparative literary studies is the entire development of world literature [12:419-439; 3:212; 28:65-73; 11:71-95; 34:7].

Comparative literary studies have a long history. As a conditional starting point, one can neglect the comparison of ancient and Shakespearean theater undertaken by Herder. As you know, the German philosopher compared these phenomena "... from the genetic and historical-comparative point of view"[14;255-257]. Proceeding from the fact that the "genesis" and historical "transformations" of the drama in the North and South are different, Herder concluded that Shakespeare cannot be judged by the standards of the "great Sophocles". "World perception", traditions of the heroic past, music, poetic expression, the degree of theatrical illusion and all of this separate Shakespearean theater from antique one [33;208]. Their "basis" is not comparable. The "differences" between Sophocles and Shakespeare formulated here are needed by Herder in order to indicate the "Shakespearean path" of contemporary German literature.

The idea of the differences between eras and "... the progressive movement of the human race" lead Goethe to the famous concept of "universal world literature". Each nation, each literature takes part in this movement, gradually revealing the "inner world" of the people with the help of language [6;568]. In the course of this development, there are "crossings", "mixture" of various thinking styles and dialects. Due to the correct remark of W. von Humboldt, often "new ways of representation are added to the existing ones," and other people's adverbs are perceived as formulas in general. Getting into a new context, the perceived "... begins to be rethought and used according to other laws" [8;316-319]. Based on the judgments of Herder, Goethe and W. von Humboldt, we can say that comparative literary criticism has as its subject the comparison of "inner worlds" expressed in literary works using various natural and poetic languages.

The closest source of comparative literary studies is the aesthetics of romanticism, with its characteristic principles of historicism and universality. The concept of romantic poetry as a synthesis of all literary genders and arts, poetry and philosophy, literature and a special way of understanding everyday life, enthusiasm and irony prepares the emergence of comparative studies. These tendencies find their completion in the aesthetics of G.F.V. Hegel, who subjects to a holistic analysis of all the epochs, styles and genres of world art known in his time [5].

The term "comparative literary criticism" appears in France by analogy with Cuvier's term "comparative anatomy (anatomie comparee)"[34;19]. This natural science orientation continues to be significant for French comparative studies of the 19th century, developing in the works of F. Brunettier and I. Tain.

The first Department of Comparative Literature was established in France, in 1896. For the genesis of comparative literary studies, one can mention the famous book of the French writer Madame de Stael "On Germany" (1810), "Readings on Dramatic Art and Literature" by A.V. Schlegel, as well as lectures on the history of European literature by F. Schlegel.

The spiritual-historical school in Germany engaged in controversy with the positivism and biology of French comparative studies. V. Dilthey, the founder of the school, who was also one of the most important theorists of hermeneutics, defended the specificity of the humanities, their special "integrity" and independence alongside the natural sciences. The German philosopher pointed out the need to study the "spirit of the artist" and the "spirit of the era" (Zeitgeist), relying on the category of "experience" (Erlebnis)[9;108-135].

The principle of the equivalence of influence and perception is one of the most important ideas of modern comparative literary studies [11;71-95]. More precisely, we should talk about a single process of "impact-perception". "Impact" and "perception" is another example of the action of direct and feedback in art. The famous theory of "influences" is perfectly correct, since "influences" have always existed and will continue to exist. However, it immediately raises doubts as soon as comparativists try to present it as the only possible research perspective. Comparative literary studies based on the theory of dialogue, emanating from the representation "Impact", changes the artistic thinking of the recipient. The creator of the "impact aesthetics" W. Iser thought about this in an interesting way. However, the dialogue that took place leads to the fact that the "sender" also becomes different. In the process of reception, new, previously hidden, semantic facets are revealed in the perceived phenomenon (author, tradition, text).

Zhirmunsky Viktor Maksimovich (1891-1971) is one of the founders of the comparative historical method of studying world literature, academician of Sciences Academy who developed the ideas of A.N. Veselovsky. V.M. Zhirmunsky is the author of fundamental works on comparative literary studies. He participated in the work of many research institutions such as the Institute for the Comparative Study of Literatures of the West and the East (1921-1935), the Institute of Language and Thought (193-1935), the Pushkin House (1935-1950). He developed global projects ("History of Western European Literatures", the cycle "Poetics", the study of the epos of the Turkic peoples, a cycle of linguistic works, works on general linguistics and comparative grammar). Laying the foundations of modern comparative studies, V.M. Zhirmunsky specially

highlighted the comparison, "... establishing international cultural interactions, "influences" or "borrowings" due to the historical proximity of these peoples and the prerequisites for their social development".

Inherent in V.M. Zhirmunsky universal knowledge determined the breadth of his scientific horizons, the idea of the need to study literature and language in the context of other layers of culture. V.M. Zhirmunsky deeply developed the problems of historical poetics, linguistic poetics, and comparative literary criticism (literary connections, comparative study of the original and translation, delimitation of "contrast", and "comparison" from influence (cross-currents). Following A.N. Veselovsky V.M. Zhirmunsky identified two types of comparisons such as historical-genetic and historically typological comparison:

1. "Historical-genetic, considers similar phenomena as a result of their relationship in origin and similar phenomena as a result of their relationship by descent and subsequent historically determined discrepancies;
2. "Historically typological comparison" explains the similarity of genetically unrelated phenomena with similar conditions of social development"[17;75].

It is clear that Goethe's Calderon differs significantly from Hoffmannsthal's Calderon, and Voltaire's Shakespeare is fundamentally different from Hugo's Shakespeare. However, Calderon and Shakespeare become different as a result of this reception. Moreover, the essence of the "circle of communication" does not at all consist in declarations of sympathy or literary enmity. The hidden connections that emerge against the backdrop of critical reviews, literary manifestos, adaptations, translations and theatrical performances are much stronger. Submitting to the repulsive mechanism, Voltaire tries Shakespeare's tricks on completely different material. "Removing" from Shakespeare brings significant artistic results.

The second principle of comparative literary studies points to the presence of "opposite currents" (A.N.Veselovsky) as a condition of perception. The "perceiving environment" and the perceiving author must be prepared to assimilate the external impulse. Then gradually from an external factor it turns into an internal factor. In the process of perception, "their own questions" are asked; their own line of processing, "re-creation" of the material is outlined.

The two main mechanisms of reception can be denoted by the terms "re-construction" and "re-creation". The term "re-construction" has its own long history and more than a century of theoretical comprehension. G.V.F. Hegel referred to it as "an invasion of immanent rhythm of concepts". V.M. Zhirmunsky wrote that "re-construction" represents "... new creativity from old materials"[13;76]. Hence it can be seen that in typological terms V.M. Zhirmunsky considers perception to be akin to creativity. According to L.Ya. Ginzburg, "reconstruction" also involves projecting onto another author your picture of the world and the ways of its embodiment [7;192].

"Recreation" means a different type of dialogue. Here the influence of the lyric element, the expansion of the perceiving "I" is limited. "Recreation" presupposes a historical approach, a sense of distance, the discovery of the "alien".

"Re-construction" and "recreation" practically do not occur in their pure form. Any reception presupposes "double explication", "interweaving", "superposition" of principles arguing with each other. The recipient notices and cuts off certain facets of the perceived phenomenon.

The ideas of A.N. Veselovsky characterized the patterns that shed light on the potential "similarity – dissimilarity" of the compared phenomena. Let's start with the obvious case where the similarity arises as a result of direct contact, has a genetic origin. A. Dima refers to such contacts as "direct" ones [10;121]. The personal acquaintance of contemporary writers plays an important role here. So, V.Ya. Bryusov was personally acquainted with the Belgian poet E. Verhaeren, whose works he knew well and translated. Bryusov considered Verhaeren as one of his teachers. Heine knew Tyutchev in a completely different way rather than Tyutchev towards Heine. Their meetings had different meanings for them, since Heine perceives Tyutchev only as a Russian diplomat[27;350-397]. The personal acquaintance of A. Beliy with the German poet Christian Morgenstern had a completely different meaning. This episode was an important milestone in the internal development of the Russian poet. During the meeting, not a word was spoken. After a lecture given by their common teacher R. Steiner, the poets looked at each other and exchanged a strong handshake. However, for A. Beliy, this moment acquired a symbolic meaning. Later, this meeting became an important motive for his poetry. A. Beliy linked his interpretation of modernity with K. Morgenstern [20;466-472]. Thus, personal acquaintance, an external factor, can be associated with internal moments of perception and creativity.

Very often, the bonds of deep sympathy bind the writers of distant eras. For example, O.E. Mandelstam felt attracted to Dante Alighieri. It is well known what significance Shakespeare had for the young Goethe. In this case the great authors of the past Homer, Dante, Shakespeare, Voltaire, Rousseau, Dickens, Tolstoy, Dostoevsky, Chekhov, Proust Joyce, Kafka become factors in the literature of other eras. So, along with Byron and Walter Scott, Shakespeare decisively influenced the development of European literature in the first third of the 19th century. The works of the writers of the past are thus involved in the dynamic,

"today's" development of culture, moving from the axis of diachrony to the axis of synchrony []1.

Sometimes there are myths associated with the personality of the poet. They also become factors in literature. The biographical figure turns into a mythological one. The myth of Novalis, Byron or Kafka is created according to the laws of artistic creation. The collective perception of such phenomena, leading to the mythologization of the image of the writer, makes one recall the mechanisms of folklore. Tradition, legend, possible scenario are given a decisive preference over facts.

There are cases when a work that did not have much significance for its own literature is mythologized in other literature. Such a fate befell, for example, the works of R. Giovagnoli "Spartacus" and E.L. Voynich "Gadfly". In literature, they were assimilated with particular intensity, since they coincided simultaneously with the social and artistic demands of the time. Beides E.L. Voinich was a propagandist of Russian culture.

For comparative literary studies, the question of knowledge of foreign languages is of great importance. This determines the range of sources that the author (critic or reader) could rely on. If the author does not know a given foreign language, then he must use translations (into his native language or other languages known to him). The foregoing does not mean at all that such a perception will be superficial or primitive. A bad translation sometimes gives an artist a lot, opening up his imagination, begins the process of "negotiating", "finishing up", "co-authorship".

Often information about a particular artist reaches the "perceiving environment" with the help of "mediator literature"[2]. So, A.S. Pushkin got acquainted with German romanticism from the books of Madame de Stael, as well as from the French translations of lectures on dramatic art by A.V. Schlegel. It is clear that A.S. Pushkin's contemporaries had a different relationship to French. They knew this language from childhood; they began to write in it earlier than in Russian. It is quite understandable that the name of Voltaire, for example, is well known to the Lyceum student Pushkin. It is found in the diaries of that time. The poetic message "Gorodok" (1815) gives a detailed description of "Father Candidus", who "... Phoebus was brought up, // From childhood he became a poet; // Read more of all, // Tears less of all; (...)". It is noteworthy that in the poetic list of poets, placed in Gorodok, Voltaire, the "symbol of freedom of love," is placed in the first place[3]. One can note that the "Russian Byron" had a French appearance at first. According to P.A. Vyazemsky, fluency in English was an exceptional phenomenon (indicated by S.V. Sapozhkov). However, much more often, when speaking of the "acquaintance" of this or that author with a foreign writer, they mean not personal communication, but the reading circle, theatrical impressions, translations. The highest form of "contact" between two authors is an original work of art, created based on a perceived sample. A literary critic, theatrical aesthetics, stage activity, translation, censorship, types of publications, as well as the assimilation of the experience of the perceived author in the original work constitute the *main aspects of reception*.

Comparative historical research is often based on the aspect principle. All types of responses of one author to the work of another are considered in interconnection, in a system. At the same time, much attention is paid to the chronology of reception. It is important to answer the question: when, in what context and what moments of the work of a foreign author were perceived? For example, the German romantic L. Tieck reflected on Shakespeare in his diaries, letters, wrote a number of articles about him, turned to his biography and work in the romantic "Letters about Shakespeare" (1800). L.Tieck's comedy "Puss in Boots" is intricately linked to the comedy tradition of the English playwright[4].

"Shakespearean layer" is complicated in L. Teak's mystery drama "Genoveva" (1799). Here Shakespeare's mastering is intertwined with Calderon's reception. Very interesting is also the translation of the tragicomedy "Pericles" undertaken by Tieck (1811). Comparing the version of the German romantic with the arrangement by I.J. Eschenburg (1782), one can observe how approaches differ, how sometimes eras confront in the transmission of only one word. So, I.J. Eschenburg, a literary man of the Enlightenment, consistently translates Shakespeare's "imagination" (imagination) with the verb "denken" (to think, to think). Here we are dealing not only with a translation from one language into another, but also with a translation into another aesthetic code. For the one who leans towards I.J. Eschenburg's rationalism "denken" seems organic. L.Tieck translates Shakespeare's "imagination" in a different way. The noun "Einbildung" (imagination) appears in his text. As it is obvious the concept of "imagination" defines the era of Romanticism.

[1] Мандельштам Осип. Разговор о Данте // Осип Мандельштам. Сочинения: в 2 т. Т. 2. / Сост. С.С. Аверинцева и П.М. Нерлера. – М., 1990. – С. 214-254.
[2] Дима А. Принципы сравнительного литературоведения. – М., 1977. – С. 123-124.
[3] Томашевский Б. Пушкин: в 2. т. Т.1. – М., 1990. – С. 69.
[4] Жирмунский В.М. Из истории западно-европейских литератур /Отв. ред. М.П. Алексеев. – Л., 1981; Карельский А.В. Драматургия немецкого романтизма первой половины XIX века: Эволюция метода и жанровых форм: дис. д-ра филол. наук. – М.,1985.

Undoubtedly, translation is one of the most important forms of text interpretation, and comparative translation studies are one of the most important branches of comparative studies. Comparison of multilingual translations of key texts of a certain era brings us closer to understanding the "concept" of national culture[5]. When comparing two works, one should take into account the followings:

- ✓ ratio of genres;
- ✓ the way of storytelling;
- ✓ composition;
- ✓ system of characters and methods of their construction;
- ✓ theme and motivational structure.

Further evidence for genetic links is verification at the level of style and language.

The presence of textual connections is revealed through the study of allusions, serious and parodic allusions, epigraphs, quotes, variations, filiations, reminiscences, adaptations, collages, pastiches, significant defaults[6].

Often the terminology of other arts helps to comprehend the phenomena of literature. Although the material of music - sound - differs from the word as a material of literature, nevertheless, artistic thinking, the principles of processing and arrangement of material by composers and writers may have common features.

In connection with the problem of citation, the terminology offered by the great composer of the 20th century A.G. Schnittke (1934-1998). Formulating the concept of "polystylistics" in music, he gives his understanding of the principles of "quotation", "allusion" and "adaptation". In the work "Polystylistic Tendencies in Contemporary Music"(1971) "The Principle of Citation" is understood as a whole "scale of techniques" associated with the use of "stereotypical microelements of someone else's style (characteristic melodic intonations, sequences, cadence formulas)" belonging to another era or another national tradition. At the level of artistic thinking, text construction and intonation structure, the listed moments are significant for literature, primarily for lyrics, where similar terminology is used (melody, intonation, harmony, formulas for the completion of segments of a poetic text rhyme, stanza schemes). Another level of citations is exact or revised citations, as well as pseudo-citations. A.G. Schnittke explains "The Principle of Allusion" in relation to "quotation". The allusion "manifests itself in the subtlest hints and unfulfilled promises on the verge of a quote, but not overstepping it". The technique of adaptation is understood as "retelling of someone else's musical text in their own musical language (similar to modern adaptations of ancient subjects in literature), or the free development of someone else's material in their own manner"[7].

It seems that these provisions have a general theoretical meaning. Let us also pay attention to the fact that Schnittke relies on the term "device", the key concept of Russian "formalism". Further stages and levels of analysis involve the study of "stereotypical microelements of someone else's style"; techniques for combining one's own and another languages during adaptation-retelling; observing the deployment of someone else's material using their own stylistic techniques; identification of direct quotes and "pseudo-citations"; an attempt to identify allusions up to significant omissions of elements, "lack of methods".

Subject of a contrastive analysis also becomes a comparison of similar (or contrasting) genre structures, compositional schemes, types of conflict, combinations of motives and themes, ways of constructing and arranging characters. At the same time, it is necessary to remember the fundamental polygeneticity of literary phenomena, which often dates back simultaneously to many different sources. The found similarity should not be absolutized. In the course of the analysis, it is necessary to raise the question of the system of similarities and differences, of the artistic meaning that this comparison reveals[8].

Another type of comparative historical research is often called typological. A.N. Veselovsky connected it not with the "migration" of folklore motifs and images, but, on the contrary, with their possible "spontaneous generation". In this case, the similarity arises, as a rule, without direct contact. In principle, we are talking about phenomena that have similar features, but are not related to a common origin. V.M. Zhirmunsky denotes such cases as "stage analogies" or "stage parallels"[9].

D. Dyurishin notes that "pure cases" of stage analogies arise through a large-scale comparison of the ancient literature of the East and West[10]. It is difficult to suppose that the authors or later performers of Homer's Iliad, the Kyrgyz Manas, or, say, the Armenian David of Sassoon communicated with each other. Undoubted features of similarity in this case go back to the general ideology of the epic age, heroic military ideals. Epic heroes in ancient monuments of different people have similar features, and related

[5] Лихачев Д.С. Концептосфера русского языка // Русская словесность. – С. 280-287.
[6] Дюришин Диониз. Теория сравнительного изучения литературы. – С. 153-159.
[7] Шнитке А.Г. Полистилистические тенденции в современной музыке // Беседы с Альфредом Шнитке / Сост. В. Ивашкин. – М., 1994. – С. 143-144.
[8] Жирмунский В.М.Эпическое творчество славянских народностей и проблемы сравнительного изучения эпоса. – М., 1958; Жирмунский В.М. Введение в литературоведение. – С. 435.
[9] Ibid:435.
[10] Конрад Н.И. Запад и Восток: статьи. 2-е изд., испр. и доп. – М., 1972.

motives and plots unfold in poems. It seems, however, that in typological studies it is almost impossible to definitively exclude a genetic explanation. Most of the work in the field of comparative literary studies is a simultaneous study of genetic and typological relationships. Texts are more often compared on a genetic basis. As a rule, contexts are correlated using the techniques of typological analysis. However, the principle of the multiple approaches to interpretation remains valid here as well. Sometimes a typological comparison of the works of authors of new and recent literature, which is not so far from each other in time and space, turns out to be more productive. Peering into the history of culture and language, scientists reconstruct a common source for a variety of contexts that, at first glance, have nothing in common.

In XX century, in the era of strengthening contacts and growing globalization, a new phase of comparative studies is emerging. Relying on the concept of intertextuality, modern researchers fundamentally depart from the concept of genetic and typological connections. The starting point is the assertion that the text is incapable of being "representative", i.e. cannot "representationally replace" either reality or any other text[11]. Comparativists of this direction often use the terms "dialogue" and "dialogicity". However, in this context, the concept of "dialogue" loses its connection with the "sociophysical reality" that has M.M. Bakhtin. What the author of "Problems of Dostoevsky's Poetics" understood as "an extra-textual intonation value context" that determines the "dialogizing background" of the perception of the work is denied.

The contemporary Austrian literary critic Zoran Konstantinovich ponders on the intertextual understanding of comparative studies in a slightly different point. In his opinion, the new approach implies, first of all, going beyond the "verbal boundaries", studying equally the categories of the author and the reader.

Conclusion.

Modern comparative studies cannot be limited to one text of one author, but seeks to cover all texts that are "condensed" in the text under study. In this case, the text is considered as "palimpsest", i.e. conversation with all other texts with which "they" (both the author and the text) came in contact during their life. Z.Konstantinovich is interested in "correlations" of various signs and codes that arise when different cultures come into contact. By connecting to the analysis all "areas of life", comparative studies, in his opinion, study the changes in the consciousness of people caused by the interaction of different cultures. It is obvious that the social component brings Z. Konstantinovich closer to M.M. Bakhtin and his understanding of "dialogue"[12]. Let us add that the "polystylistics" of A.G. Schnittke represents "an impulse to expand the musical space", a musical tool "for the philosophical substantiation of the connection of times". The author of "Concerto grosso No.1" puts forward the idea of the "absolute", "non-associative value of the work", which is not reduced to a play of quotation.

At this point, the aspirations of modern comparativists diverge. Some understand "intertextuality" as a step forward in understanding literary interrelationships, as the entry of comparative studies into the context of modern semiotic cultural studies. Others, as already noted, cut off a number of levels, putting forward the thesis about the "unrepresentative nature of the artistic word". It seems that this opposition is partly removed due to the approach to literature as a system. Different links of this system, having different functions, must acquire their own language of description. Direct and reverse connections, making the system of literature fundamentally open, "remove" the question of the only possible language of description.

A number of comparative works based on the intertextual approach are known[13]. Carried out by talented scientists, these studies are beyond doubt. However, it is very difficult to learn comparative analysis from them. The problem of "adequacy of comparison" from the point of view of intertextuality is meaningless. Meanwhile, literary technique emerges gradually. And here the limiting moments can play not only a negative role. Knowledge of the comparison criteria can serve as the foundation for acquiring skills of comparative analysis. Then, having passed this stage and convinced of its insufficiency, the researcher can try his hand at intertextual comparative studies. Let us refer to a specific example of a genetic comparison undertaken by Academician M.P. Alekseev and dedicated to the theme "Emil Zola and N.G. Chernyshevsky" (1940)[14].

The author begins his research with a reminder of the fact that E. Zola "has never been to Russia" and did not know the Russian language. However, Russia was in the writer's field of vision. Zola corresponded with Russian correspondents, was friends with I.S. Turgenev, six years collaborated with the magazine "Bulletin of Europe".

The next step in the analysis is to identify the reading circle of E. Zola, to determine the degree of

[11]Смирнов И.П. Порождение интертекста: Элементы интертекстуального анализа с примерами из творчества Б.Л. Пастернака. 2-е изд. – СПб., 1995.

[12]

[13]Жолковский А.К., Щеглов Ю.К. Работы по поэтике выразительности: Инварианты – Тема – Приемы – Текст/ Предисл. М.Л. Гаспарова. – М., 1996.

[14] Алексеев М.П. Сравнительное литературоведение / Отв. ред. академик Г.В. Степанов. – Л., 1983. – С. 414-426.

his acquaintance with Russian literature. French literary scholars have long noticed the fact that E. Zola read in translations of works by L.N. Tolstoy and I.S. Turgenev, responded to them.

Obviously, M.P. Alekseev begins with characterizing the context, the "basis" of reception. Knowledge of the Russian language, translations, personal contacts, correspondents, cooperation in Russian publications and reading circle are the main questions of the first stage of the study.

Further, the analysis is connected with the reconstruction of the history of translations of the works of N.G. Chernyshevsky into French. M.P. Alekseev turns to the personality of the translator of the novel, restores the remarkable context of his first publication into French "What is to be done?" translated by A.N. Tveritinov, "an ardent admirer of Chernyshevsky". The translation, released "in a limited number of copies", nevertheless served as the basis for subsequent editions of the novel in European languages. M.P. Alekseev traces the fate of a number of books donated by Tveritinov to famous writers. So, he also notes the fact that one copy was received by I.S. Turgenev. In search of further evidence of E. Zola's possible awareness of the novel by M.P. Chernyshevsky M. Alekseev addresses critical responses to What is to be done? in the French press.

And yet the researcher is inclined to the cautious conclusion that it was not possible "to establish with all accuracy when and through whom the novel by N.G. Chernyshevsky, of course, in the French translation by A.N. Tveritinova, became known to Emil Zola". We add that the mediator in this case was the "perceiving environment": the presence of interest in Russia in E. Zola's circle, friendship with Turgenev, who facilitated Zola's contacts with Russian writers.

Textual coincidences are also important. One of them, M.P. Alekseev sees in the word "phalanster", which is used by the heroine E. Zola. Another indisputable quote is connected with the sign of the new store on Nevsky, which is being opened by Vera Pavlovna and Mertsalova: "Au bon travail. Magasin des Nouveautés". The store in E. Zola's novel is called "Au bonheur des dames. Magasin des nouveautés". At the end of his article, M.P. Alekseev once again returns to the idea that E. Zola's novel had many sources. However, the novel What is to be done? should also be included. However, the scientist also poses further questions, outlining the prospect of new research. "Shouldn't we look for traces of N.G. Chernyshevsky and in the later works of E. Zola, for example in "Trud (Labour)" (1901), with his story about the new principles of civic consciousness, with his ideas of solidarity and vigorous social labor?" "Slow reading" of the article by M.P. Alekseev shows that genetic comparison requires from a literary critic a great deal of knowledge, discretion, accuracy and caution in conclusions.

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Impact Factor:					
	ISRA (India) = **6.317**	**SIS** (USA) = **0.912**	**ICV** (Poland) = **6.630**
	ISI (Dubai, UAE) = **1.582**	**РИНЦ** (Russia) = **3.939**	**PIF** (India) = **1.940**
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	JIF = **1.500**	**SJIF** (Morocco) = **7.184**	**OAJI** (USA) = **0.350**

SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2022 **Issue:** 04 **Volume:** 108

Published: 15.04.2022 **http://T-Science.org**

Issue **Article**

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STUDY OF A CORROSION INHIBITOR BASED ON MONOETHANOLAMINE AND PHOSPHORUS(V)-CHLORIDE

Abstract: *In this work, a study was carried out on the synthesis of a corrosion inhibitor of the RMA-1 brand. The effectiveness of corrosion inhibition was analyzed using IES and SEM analysis of the surface.*

Key words: *monoethanolamine, phosphorus(v)-chloride, corrosion inhibitor, IES, SEM*

Language: *Russian*

Citation: Durdubaeva, R., & Beknazarov, Kh. (2022). Study of a corrosion inhibitor based on monoethanolamine and phosphorus(V)-chloride. *ISJ Theoretical & Applied Science, 04 (108),* 346-353.

Soi: http://s-o-i.org/1.1/TAS-04-108-43 ***Doi***: https://dx.doi.org/10.15863/TAS.2022.04.108.43

Scopus ASCC: *1600.*

ИССЛЕДОВАНИЕ ИНГИБИТОРА КОРРОЗИИ НА ОСНОВЕ МОНОЭТАНОЛАМИНА И ФОСФОРА(V)-ХЛОРИДА

Аннотация: *В данной работе проведено исследование по синтезу ингибитора коррозии марки РМА-1. Эффективность ингибирования коррозии анализировали с помощью IES и SEM анализа поверхности.*

Ключевые слова: *моноэтаноламин, фосфора(v)-хлорид, Ингибитор коррозии, IES, SEM.*

Введение

Различные промышленные оборудование и оборотные системы охлаждения требуют добавления ингибиторов в технологические жидкости и растворы, чтобы снизить скорость коррозии металла. Ингибиторы коррозии особенно важны в связи с обработкой травлением или кислотной очисткой, которое они наносятся на поверхности стали. В качестве промышленного кислотного очистителя и травильной кислоты очень часто используется HCl [1]. Для удаления окалины с поверхности используется травление, которое обычно применяется перед нанесением покрытия методом горячего погружения или гальваники [2]. Менее суровая обработка, чем травление, такая как кислотная очистка, используется для окончательной отделки металлических поверхностей перед нанесением покрытия, окраской или хранением. Кислые растворы соляной кислоты от 40 до 60 об.% (часто содержащие до 1% ингибитора) используются при комнатной температуре для удаления почвы и легкой ржавчины. Следовательно, большие исследовательские усилия были посвящены поиску новых подходящих соединений для использования в качестве ингибиторов коррозии углеродистой стали в кислых растворах. Эти исследования показали, что существует большое количество органических и неорганических соединений, которые в небольших количествах добавляются в коррозионные среды, что может эффективно снизить скорость коррозии [3–5].

Было проведено множество работ по оценке некоторых органических соединений в качестве ингибиторов коррозии различных металлов в различных средах [6-8].

Обычно эффективные органические ингибиторы содержат либо атомы азота, серы или кислорода в своей структуре, либо электроотрицательные функциональные группы и π-электроны в тройных или сопряженных двойных связях. Адсорбционные взаимодействия между адсорбатами и поверхностью металла объясняют ингибирующее действие этих органических соединений.

Не смотря на то, что многие органические ингибиторы успешно используется в промышленности и рентабельны, продолжается поиск новых органических ингибиторов на основе местных сырьевых ресурсов, которое может привести к уменьшению цен используемых ингибиторов [9-10].

2. МАТЕРИАЛЫ И МЕТОДЫ.

Синтез ингибитора коррозии проводили на основе моноэтаноламина и фосфор(V)-хлорида (PMA-1).

2.1. Приготовление растворов и образцов стали. Процентный состав испытуемого образца стали ст20: 0,04% P, 0,06% Si, 0,06% Al, 0,20% Mn, 0,05% C, 0,02% S, 0,02% Cr и остальное Fe. Обработка поверхности образцов заключалась в мокром шлифовании наждачной бумагой марок № 400 - № 1200; ополаскивали дистиллированной водой, обезжиривали ацетоном и, перед использованием просушивание проводили теплым воздухом.

Коррозионная среда представляла собой 1M HCl, приготовленная из 37%-ного реагента аналитической чистоты. Из исходного раствора готовили четыре разбавленных раствора с ингибитором в следующих концентрациях: 0,1, 0,3, 0,5 и 1,0 г/л.

2.2. Измерения потери веса. Измерения потери веса проводили в 50 мл 1M растворе HCl, содержащего 0,1, 0,3, 0,5 или 1,0 г/л синтезированного ингибитора. Стальные купоны размером 1,0 см × 4,0 см × 0,1 см погружали полностью. После 3 ч погружения каждый образец извлекали из испытательного раствора и погружали в 20% раствор гидроксида натрия, содержащий 200 г/л мелкий порошок цинка для очистки от продуктов коррозии. Затем купоны несколько раз протирали щеткой из щетины под водой для удаления продуктов коррозии и, наконец, сушили в ацетоне и повторно взвешивали.

Эксперименты проводили в трех экземплярах, и в каждом случае сообщалось среднее значение потери веса (отклонение менее 5% от среднего значения). Измерения потери веса проводили при температурах 293, 303, 313 и 323 K в отсутствие и в присутствии различных концентраций ингибитора в исследуемом растворе. Данные о потере веса использовали для расчета скорости коррозии (CR), выраженной в единицах мг/см^2·с, и эффективности ингибирования в процентной шкале η (%).

2.3.Электрохимические измерения. Стальные образцы для электрохимических экспериментов были обработаны в цилиндрических образцах и затем погружены в политетрафторэтилене (ПТФЭ) с открытой геометрической круглой площадью 0,16 см^2. Перед каждым экспериментом поверхность электрода предварительно обрабатывалась, как описано выше. Электрохимические эксперименты проводились в трехэлектродной электрохимической ячейке с использованием электрохимической станции Zahner IM6. Платиновый лист использовался в качестве противоэлектрода, а насыщенный каломельный электрод (SCE) использовался в качестве электрода сравнения. Все потенциалы в данной работе отнесены к SCE (0,2412 В относительно стандартного водородного электрода). Измерения проводились в растворах с естественной аэрацией и без перемешивания после 1 часа погружения при 293 ± 1 K. Измерения импеданса (EIS) проводились при потенциале коррозии (E_{corr}) в диапазоне частот от 100 кГц до 100 мГц с амплитудой сигнала возмущения 10 мВ. Кривые потенциодинамической поляризации (PP) регистрировали путем изменения приложенного потенциала E_{app} со скоростью сканирования 1,0 мВ/с, в то время как регистрировали ток I. Так же, как и гравиметрические измерения, кривые PP были измерены в трех экземплярах, чтобы подтвердить приемлемую воспроизводимость результатов.

2.4.УФ-видимые и ИК-спектрофотометрические измерения. Функциональные группы, ответственные за ингибирование, исследовали с использованием ИК-Фурье спектров. Спектры твердых соединений, образовавшихся на мягкой стали после 3-дневного погружения в 1M HCl без ингибитора и с ингибитором 1,0 г/л. Спектры регистрировали в диапазоне от 4000 до 500 см$^{-1}$ с разрешением 1 см$^{-1}$ и 20 сканирований и на инфракрасном спектрофотометре с преобразованием Фурье (FT-IR) SHIMADZU (IRAffinity-1S).

Спектрофотометрические измерения поглощения в УФ-видимой области проводились для 1M раствора HCl без и с 1,0 г/л ингибитора до и после погружения образцов из мягкой стали при 293 ± 1 K в течение 3 дней. Все спектры записаны на спектрофотометре UV-1900i.

2.5.Анализ поверхности с помощью SEM. Морфологические исследования образцов из

мягкой стали проводились с использованием СЭМ-исследования поверхностей, подвергшихся воздействию различных тестовых растворов. Микрофотографии получали с помощью растрового электронного микроскопа Zeiss Supra 55VP, работающего с вольфрамовой нитью в качестве источника электронов. Образцы из низкоуглеродистой стали размерами 2см×1см×0,14см последовательно шлифовали наждачной бумагой различных марок (№ 400 - № 1200). После этого образцы полировали, используя ткань с алмазной пастой 5 мкм, чтобы получить поверхность, близкую к зеркальной. Затем очищенные купоны погружали на 2 часа в контрольный раствор 1M HCl без и с 1,0 г/л ингибитора при 293 ± 1 K, и, наконец, они промывались дистиллированной водой, сушились на теплом воздухе и подвергались анализу. Исследовали поверхности сталей с помощью SEM.

3. РЕЗУЛЬТАТЫ И ОБСУЖДЕНИЕ

3.1. Измерения потери веса, скорости коррозии и эффективность ингибирования. Коррозию мягкой стали в 1M HCl, содержащей ингибитора коррозии в различных концентрациях 0,005 г/л PMA-1 и Flogart MS6217, изучали путем измерения потери веса, т.е. путем измерения массы металла, превращенного в продукты коррозии, на единицу площади поверхности на единицу время. В этом случае η (%) рассчитывается по следующим уравнениям:

$$C_R = \frac{W_b - W_a}{A \cdot t} \qquad (1)$$

$$\eta(\%) = \frac{C_{R(blank)} - C_{R(inh)}}{C_{R(blank)}} \times 100 \qquad (2)$$

где W_b и W_a - массы купонов, измеренные до и после погружения в испытательные растворы, A - площадь воздействия, а t = 3 ч - время воздействия, C_R - скорость коррозии мягкой стали, а индексы (blank) и (inh) указывают на отсутствие и присутствие ингибитора в соляном растворе соответственно.

Экспериментальные результаты, полученные при измерении потери веса мягкой стали в 1M растворе HCl без ингибитора и с различными концентрациями ингибитора коррозии PMA-1, представлены на рисунках 2 и 3. На рисунке 2 показаны графики зависимости скорости коррозии (C_R) от концентрации ингибитора (C), при разных температурах. Эти графики показывают, что скорость коррозии снизилась в ответ на добавление увеличивающихся количеств ингибитора коррозии PMA-1 в коррозионную среду. В частности, скорость коррозии стальных образцов после добавления PMA-1 заметно снижается по мере увеличения концентрации PMA-1 до 0,3 г/л, а после этой концентрации снижение становится менее заметным. Это указывает на то, что PMA-1 действует как ингибитор, который эффективно снижает воздействие коррозионного раствора. Дальнейший проведение эксперимента рисунка 1 показывает, что скорость коррозии мягкой стали в отсутствие и в присутствии ингибитора увеличивается с повышением температуры.

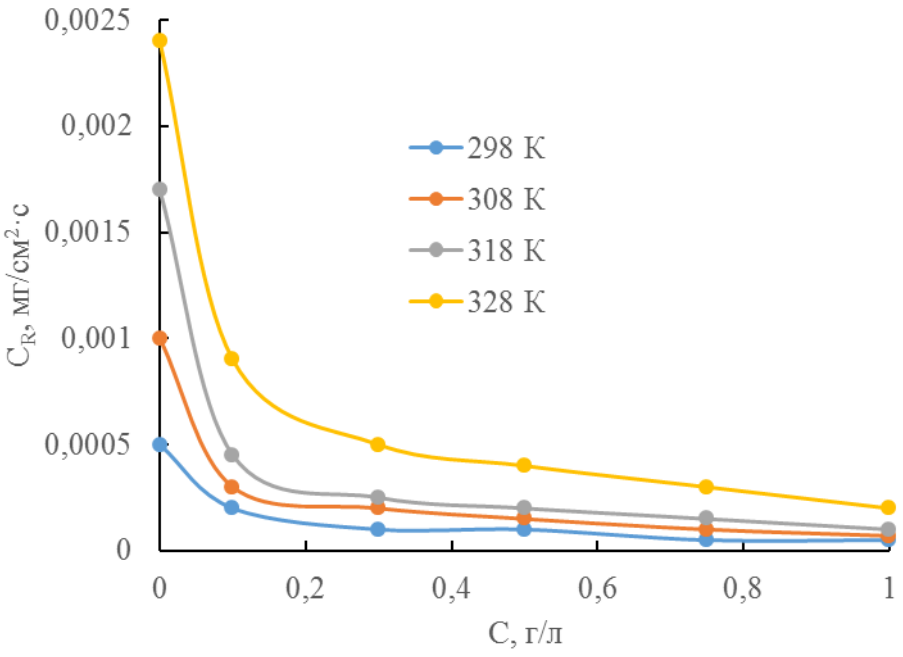

Рисунок 1. Скорость коррозии (C_R) мягкой стали в 1M HCl, содержащей различные концентрации (C) PMA-1 при разных температурах.

На рис. 3 показан график зависимости η(%) от концентрации ингибитора при различных температурах. Изучение графиков показывает начальное быстрое увеличение η(%), при увеличении концентрации РМА-1 до 0,3 г/л, но эффективность ингибирования увеличивается лишь незначительно при дальнейшем увеличении концентрации ингибитора. Это указывает на то, что РМА-1 действует как эффективный ингибитор даже при низких концентрациях. Более того, эффективность ингибирования снижается с повышением температуры. Тот факт, что эффективность ингибирования снижается с повышением температуры, можно понять с точки зрения усиления процесса растворения металла, в то время как скорость десорбции молекул ингибитора увеличивается при более высокой температуре [18,19].

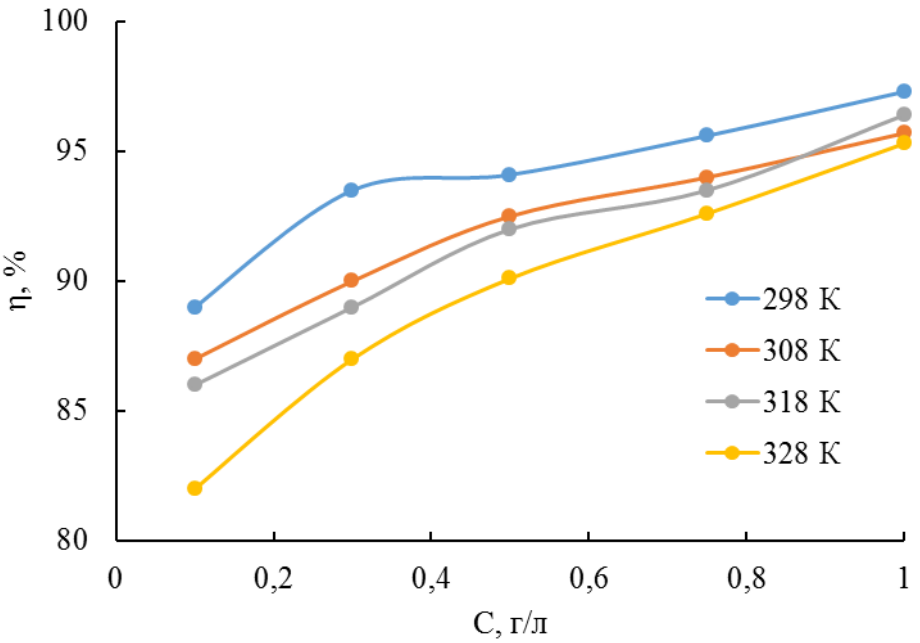

Рисунок 2. Эффективность ингибирования коррозии в процентах η (%) стали Ст20 от концентрации (С) РМА-1 в 1М HCl при различных температурах.

Изучение данных, представленных на рисунках 1 и 2, показывает, что скорость коррозии увеличивается с повышением температуры как в незащищенных, так и в ингибированных условиях.

Измерения потери веса, проведенные при 293 ± 1 К в 1 М растворах HCl с концентрацией 0,005 г/л РМА-1, позволили определить эффективность ингибирования η (%) 87,8 % для РМА-1 и 84,7 % для Flogart MS6217.

Для расчета энергии активации реакции коррозии использовалось уравнение Аррениуса (3):

$$C_R = A_{exp}\left(-\frac{E_a}{RT}\right) \qquad (3)$$

где C_R - скорость коррозии, R - газовая постоянная, T - абсолютная температура, A - предэкспоненциальный множитель,

Энергию активации (E_a) при различных концентрациях РМА-1 в соляном растворе определяли линейной регрессией $\ln C_{RVS}$ от 1/T (Рис. 3) и результаты показаны в таблице 1.

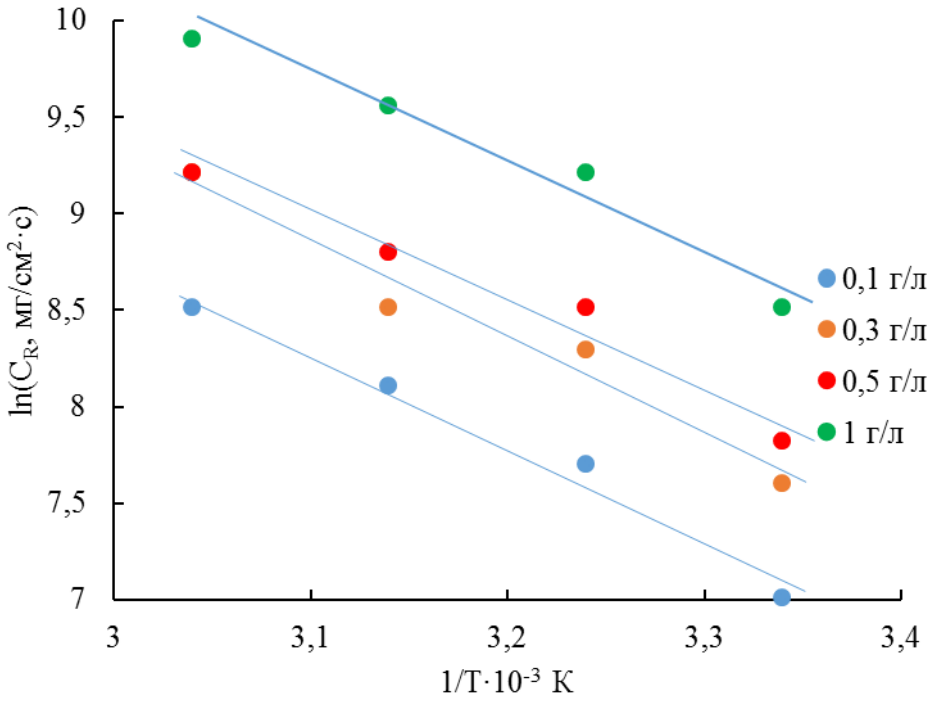

Рисунок 3. Графики Аррениуса скорости коррозии стали в 1М HCl в отсутствие и в присутствии экстракта РМА-1 при различных концентрациях.

Коэффициенты линейной регрессии близки к 1, что указывает на то, что коррозию стали в 1М HCl кислоте можно объяснить с помощью кинетической молекулярной теории. Изучение таблицы 1 показывает, что значения E_a, определенные в 1М HCl, содержащей различные концентрации РМА-1, больше, чем значение, полученное для неингибированного холостого раствора.

Таблица 1. Расчетные значения доля покрытой поверхности θ, степень защиты (η) и энергии активации E_a для скорости коррозии мягкой стали в 1М HCl в отсутствие и в присутствии различных концентраций РМА-1.

C	θ	η, %	E_a, J/mol
0.0	–	–	44,6
0.1	0,897	89,7	49,4
0.3	0,935	93,5	51,8
0.5	0,941	94,1	53,9
1.0	0,973	97,3	55,7

Снижение эффективности ингибирования с повышением температуры в сочетании с более низкой энергией активации скорости коррозии в неингибированном растворе, чем в ингибированном растворе, может быть связано с физической адсорбцией между поверхностью железа и ингибитором [20].

3.2. Электрохимические измерения

3.2.1. Кривые потенциодинамической поляризации (ПП)

Кривые потенциодинамической поляризации (ПП), показанные на рисунке 4, были измерены для стали Ст20 в 1М холостом растворе HCl и в том же растворе, содержащем различные концентрации ингибитора коррозии РМА-1.

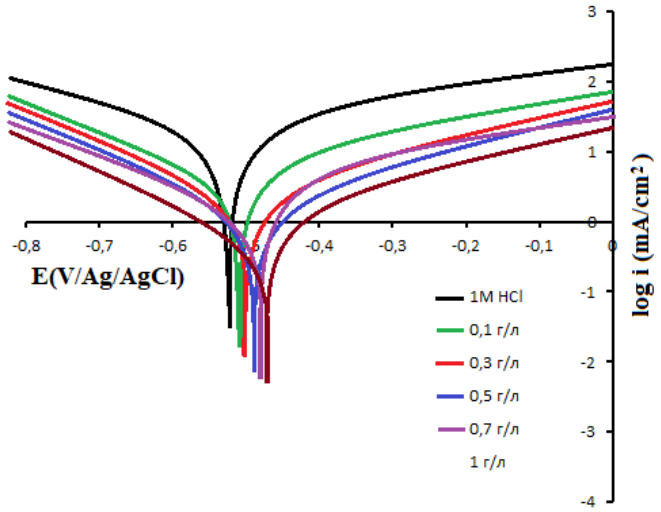

Рис. 4. Поляризационные кривые для стали Ст20, записанные после 1 ч погружения при 293 ± 1 К в 1 М HCl, содержащую различные концентрации РМА-1.

Каждое увеличение концентрации РМА-1 приводит к уменьшению плотности тока как на анодной, так и на катодной ветвях кривых ПП. Однако наклоны Тафеля и потенциал коррозии практически не изменились. Очевидно, что РМА-1 действует как ингибитор смешанного типа, одновременно уменьшая анодный вклад (растворение металла) и катодный вклад (выделение водорода) в процесс коррозии. Эти результаты совместимы с режимом ингибирования, характеризующимся геометрическим блокированием поверхности металла адсорбированными ингибирующими частицами. Эффект геометрической блокировки в основном приводит к уменьшению площади реакции.

Мансфельд [21,22] предложил точную процедуру анализа для определения поляризационного сопротивления Rp и тафелевских наклонов по поляризационным данным (E_{app}), измеренным в небольшом потенциальном окне вокруг E_{corr}. Во-первых, Rp было получено, как обычно, до тафелевских областях поляризационной кривой из наклона касательной в точке E_{corr}. Во-вторых, используя подход Мансфельда, анодные (ba) и катодные (bc) тафелевские наклоны были рассчитаны посредством нелинейной аппроксимации методом наименьших квадратов данных поляризации в форме 2.3IRpvs. (E_{app}–E_{corr}) к соответствующему теоретическому выражению в пределах потенциального окна (E_{corr} ± 30 мВ). Таблица 2 содержит результаты этого анализа данных поляризации вместе со значениями E_{corr} и плотности тока коррозии j_{corr}.

Таблица 2. Результаты анализа потенциодинамических поляризационных кривых для стали Ст20 в 1М HCl с различными концентрациями РМА-1 при 293 ± 1 К.

C, г/л	E_{corr} (mV)	J_{corr} (μA cm^2)	*-bc* (mV/dec)	ba (mV/dec)	R_p Ωcm^2	η %
0,0	-559	918	164	141	37,4	-
0,1	-567	396	163	134	82,6	90,3
0,3	-571	187	162	129	173,1	92,4
0,5	-573	139	163	131	224,9	95,1
1,0	-570	114	146	136	267,5	96,8

На рис. 6 сопоставлены кривые ПП, измеренные для мягкой стали в 1М неингибированном растворе HCl и в присутствии 0,007 г/л РМА-1 и Flogart MS6217.

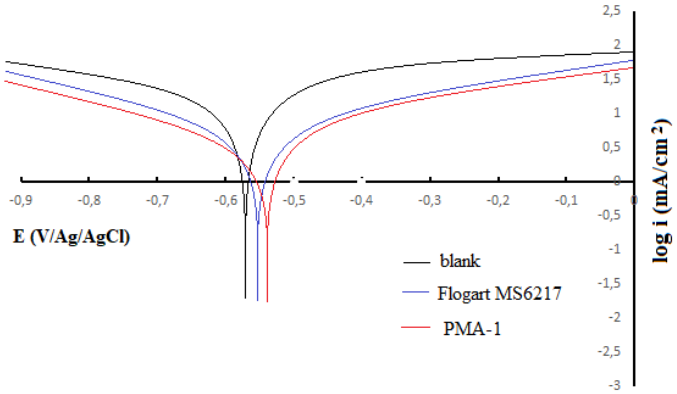

Рис. 5. Поляризационные кривые, записанные после 1 ч погружения для стали Ст20 при 293 ± 1 К в 1М не ингибированный раствор HCl и 1М раствор HCl, содержащий 0,007 г/л Flogart MS6217 и 0,007 г/л PMA-1.

Добавление обоих ингибиторов коррозии к раствору HCl приводит к меньшим плотностям тока как для анодной, так и для катодной ветвей кривых ПП по сравнению с кривой для неингибированного раствора. Уклоны Тафеля и потенциал коррозии практически не изменились. Оба ингибиторов коррозии, PMA-1 и Flogart MS6217, действуют как ингибиторы смешанного типа, одновременно уменьшая анодный и катодный вклад в процесс коррозии. Также из рис. 5 видно, что синтезированный нами ингибитор коррозии PMA-1 не уступает промышленному ингибитору коррозии Flogart MS6217.

Таблица 3 содержит результаты, полученные из анализа данных поляризации, вместе со значениями для E_{corr} и плотности тока коррозии j_{corr}.

Таблица 3. Результаты анализа кривых ПП стали Ст20 в 1М растворе HCl, содержащем 0,007 г/л Flogart MS6217 и 0,007 г/л PMA-1 при 293 ± 1 К.

Ингибиторы коррозии	E_{corr} (mV)	J_{corr} (μA cm^2)	*-bc* (mV/dec)	ba (mV/dec)	R_p Ωcm^2	η %
PMA-1	-0,578	143,2	164	135	254,3	95,7
Flogart MS6217	-0,567	256,3	164	135	231,8	92,5

Эффективность ингибирования промышленного ингибитора коррозии сравнима со значением, полученным с использованием синтезированного ингибитора коррозии PMA-1 при его самой низкой проверенной концентрации. Эти данные предполагают, что сильное ингибирующее действие PMA-1 в основном связано с присутствием фосфора и азота в этих соединениях.

Заключение, эффективность ингибирования коррозии азот- и фосфорсодержащего ингибитора коррозии (PMA-1) на стали Ст20 была исследована в агрессивном растворе хлористого водорода с использованием потенциодинамической поляризации. Поляризационные параметры при 1 г/л фосфорсодержащего ингибитора коррозии PSK-1 в 1M HCl имеют значительно более высокую эффективность ингибирования, равную 96,8 % соответственно, а также эффективность ингибирования фосфорсодержащего олигомера PSK-1 возрастает с увеличением концентрации ингибитора.

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
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	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2022 **Issue:** 04 **Volume:** 108

Published: 16.04.2022 **http://T-Science.org**

Issue Article

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IMPROVED COMPREHENSIVE METHOD OF CALCULATING OUTPUT POWER OF HE-NE LASERS

Abstract: *In this paper, an improved method for estimating the He-Ne laser radiation power is compared with experimental data, which takes into consider the dependence of the population inversion on the laser axis on the transverse dimensions of the active element. The numerical calculations results correspond to the experimental data.*

Key words: *effective mode volume, population inversion, He-Ne laser power, tube geometry.*

Language: *English*

Citation: Kozhevnikov, V. A., & Ammosov, A. P. (2022). Improved comprehensive method of calculating output power of He-Ne lasers. *ISJ Theoretical & Applied Science, 04 (108)*, 354-357.

Soi: http://s-o-i.org/1.1/TAS-04-108-44 ***Doi***: https://dx.doi.org/10.15863/TAS.2022.04.108.44

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Introduction

This paper continues the cycle of papers devoted to the dependence of the energy characteristics of the He-Ne laser on the geometry of its active element [1-14]. In these articles, a method was proposed for estimating the radiation power of a He-Ne laser with an arbitrary geometric shape of the active element. Namely, it is proposed to be considered by the formula

$$P = \int_{NMV} \varepsilon E^2 \delta N dV \qquad (1)$$

where E is the modulus of electric field strength in the resonator, δN is the population inversion and the integration occurs in the effective mode volume *NMV*. *NMV* is defined as a body bounded by the surface, where the $E^2\delta$N value falls in e^2 times compared to $E_0^2\delta N_0$ (where δN_0 is the δN value at the axis, and e is the natural logarithm base). The emission power of a laser with circle, rectangular and elliptical cross sections of the active element with different transverse dimensions has been calculated, assuming the same δN_0. However, with the further development of the model, assumptions were made about the influence of the transverse dimensions of the tube on the value δN_0. In [14], this problem was investigated, and it was shown that indeed, δN_0 should decrease with an increase in the transverse size of the active element. In this paper, we compare the results of calculations of the power of a He-Ne laser with active elements in the form of cylindrical tubes of different radii with experimental data from classical works.

Population inversion and He-Ne laser output power

First, let us recall the main results obtained earlier. In [12], the processes in the discharge positive column (PC) in laser tubes of smoothly varying diameter were investigated, and a system of equations was obtained that solves the problem of coupling external, controlled parameters of the PC (radius of the discharge channel $R(z)$, gas inlet pressure p_H, and discharge current I_p) with its main internal characteristics: the electron temperature T_e, the concentration of charged particles n, longitudinal electric field strength $\mathbf{E}_z$. There was also obtained such an expression for the electron concentration as a

function of the radial r and longitudinal z coordinates: $n_e = n_e(r, z)$:

$$n_e(r,z) = \frac{J_0(r\mu_1^{(0)} / R_z)\cdot 0,737 I_p}{R_0^2 f_R^2(z) e b_e E_{0z} f_{E_z}(z)} \quad (2)$$

where J_0 – zero-order Bessel function, $\mu_1^{(0)} \approx 2.4048$ – its first root, $R(z) \equiv R_z = R_0 f_R(z)$ - is the discharge channel radius as a function of the longitudinal coordinate z ($0 < z < l$), directed along the discharge tube axis ($R_0 = R(0)$ - is the channel radius value at $z=0$ => $f_R(0)=1$), I_p - is the discharge current, e – elementary charge, b_e electron mobility. In equation (2) $\mathbf{E}_z$ - the longitudinal electric field has the form $\mathbf{E}_z = \mathbf{E}_{0z} f_{Ez}(z)$ (where $\mathbf{E}_{0z} = \mathbf{E}_z(0)$, $f_{Ez}(0)=1$)) and it is from the equation:

$$(eE_z)^2(z) = 3kT_e(z)\frac{m_e \nu_{ea}(z)}{m_a}\{m_e \nu_{ea}(z) + \frac{4}{R(z)^2 \nu_{ia}}\left[eU_i + kT_e(z)\left(1,7 + \ln 0,4\sqrt{\frac{m_i}{m_e}}\right)\right]\} \quad (3)$$

where m_a, m_i, m_e – are the masses of atoms, ions, and electrons respectively, ν_{ea} and ν_{ia} - are the frequencies of electron-atomic and ion-atomic collisions, U_i - atom ionization potential. In turn, the electron temperature T_e in (3), which is a function of the longitudinal coordinate ($T_e = T_e(z)$), can be found from the equation:

$$\sqrt{\frac{\varepsilon_i}{kT_e(z)}}\cdot \exp\left(\frac{\varepsilon_i}{kT_e(z)}\right) / \left(1 + \frac{\varepsilon_i}{2kT_e(z)}\right) = 0,552\frac{e}{\sqrt{m_e}}\left(\frac{C_i\sqrt{\varepsilon_i}}{b_i n_a}\right) n_a^2 R_0^2 f_R^2(z) \quad (4)$$

where ε_i - is the ionization energy, k – is Boltzmann's constant, b_i - i is the ions mobility, n_a - is a concentration of atoms, C_i - is a constant of approximation of the direct ionization cross section $\sigma_{0i}(\varepsilon_e)$ dependence on the electron's energy ε by the linear dependence: $\sigma_{0i} = C_i(\varepsilon_e - \varepsilon_i)$ at $\varepsilon_e \geq \varepsilon_i$.

Knowing the electron concentration, it is possible to estimate the metastable helium atoms concentration and excited neon atoms, and then population inversion δN. Using the values of the PC parameters in the work [14] it was shown that the population inversion δN_0 on the axis of the cylindrical tube decreases with increasing tube radius a.

In this regard, the method of calculating the He-Ne laser power is refined considering the dependence $\delta N_0(a)$. For a laser with a cylindrical active element, the radiation power will be according to the formula:

$$P = \int_0^{2\pi}\int_{z_1}^{z_2}\int_0^{\rho(z)} \varepsilon E^2 \delta N d\varphi dz dr =$$

$$= \frac{4\pi E_0^2 \varepsilon R_e}{k}\int_{z_1}^{z_2} dz \delta N_0(a)\left(\frac{1-\exp(-2\rho^2(z)/w^2(z))}{4} - \frac{\mu_1^{(0)2}}{32a^2}(w^2(z) - (w^2(z) + 2\rho^2(z))\cdot \exp(-2\rho^2(z)/w^2(z))) + \frac{\mu_1^{(0)4}}{512a^4}(w^4(z) - (w^4(z) + 2w^2(z)\rho^2(z) + 2\rho^4(z))\cdot \exp(-2\rho^2(z)/w^2(z)))\right) \quad (5)$$

where R_e is the radius of curvature of the corresponding equivalent confocal resonator: $R_e = \{4S(R_1 - S)\}^{1/2}$, $S = d(R_2 - d)/(R_1 + R_2 - 2d)$, R_1 and R_2 – radii of mirrors, d – distance between mirrors, z_1 and z_2 – coordinates specifying the position of the tube inside the optical resonator ($z_2 - z_1 = l$ – tube length), z it is counted from the Gaussian beam waist, E_0 – the value of the field on the axis at $z=0$, $k = 2\pi/\lambda$ – wavenumber, $w(z) = \sqrt{(R_e + 4z^2/R_e)/k}$, $\mu_1^{(0)} = 2.4048$ – is the first solution of the zero-order Bessel function J_0, a – is the radius of the tube, $\rho(z)$ – solution equation

$$\{2 + \ln 2 - \ln(w^2(z)k/R_e) - 2r^2/w^2(z) + \ln(J_0(\mu_1^{(0)} r/a))\}|_{r=\rho} = 0$$

and the dependence $\delta N_0(a)$ is taken from the paper [14].

The purpose of this paper was to compare the calculations of the He-Ne laser radiation power according to the refined formula (5) with experimental data for cylindrical tubes of different radius a.

Calculation and comparison with experiment

We have taken experimental data from well-known classical fundamental works on He-Ne laser [15-19]. The calculation results according to formula (5) and experimental data are shown in Figure 1. Here, the radiation power (calculated P_{teor} and experimental P_{exp}) is deposited along the ordinate axis, and the laser number from the experiments is deposited along the abscissa axis. The laser parameters are given in Table 1.

The parameters of the corresponding lasers are given in Table 1.

Table 1. Laser parameters

Laser number	1	2	3	4	5
Work	[15]	[15]	[16]	[17]	[18]
l, m	0.125	0.55	0.11	0.22	0.45
a, mm	0.75	1.5	1.5	0.75	0.775
d, m	0.22	0.7	0.25	0.34	1.3

R_1, m	**0.5**	**2**	**3**	**2**	**1.5**
R_2, m	∞	∞	**10**	**2**	**1.5**
Laser number	**6**	**7**	**8**	**9**	**10**
Work	**[19]**	**[19]**	**[19]**	**[19]**	**[19]**
***l*, m**	**0.11**	**0.11**	**0.11**	**0.11**	**0.11**
***a*, mm**	**0.3**	**0.4**	**0.5**	**0.3**	**0.4**
***d*, m**	**0.135**	**0.135**	**0.135**	**0.135**	**0.135**
R_1, m	**0.4**	**0.4**	**0.4**	**0.8**	**0.8**
R_2, m	**0.4**	**0.4**	**0.4**	**0.8**	**0.8**
Laser number	**11**	**12**	**13**	**14**	**15**
Work	**[19]**	**[19]**	**[19]**	**[19]**	**[19]**
***l*, m**	**0.11**	**0.38**	**0.38**	**0.38**	**0.38**
***a*, mm**	**0.5**	**0.75**	**1.0**	**1.25**	**1.5**
***d*, m**	**0.135**	**0.45**	**0.45**	**0.45**	**0.45**
R_1, m	**0.8**	**1.265**	**1.265**	**1.265**	**1.265**
R_2, m	**0.8**	**1.265**	**1.265**	**1.265**	**1.265**
Laser number	**16**	**17**			
Work	**[19]**	**[19]**			
***l*, m**	**0.38**	**1.195**			
***a*, mm**	**1.75**	**1.75**			
***d*, m**	**0.45**	**1.265**			
R_1, m	**1.265**	**3.572**			
R_2, m	**1.265**	**3.572**			

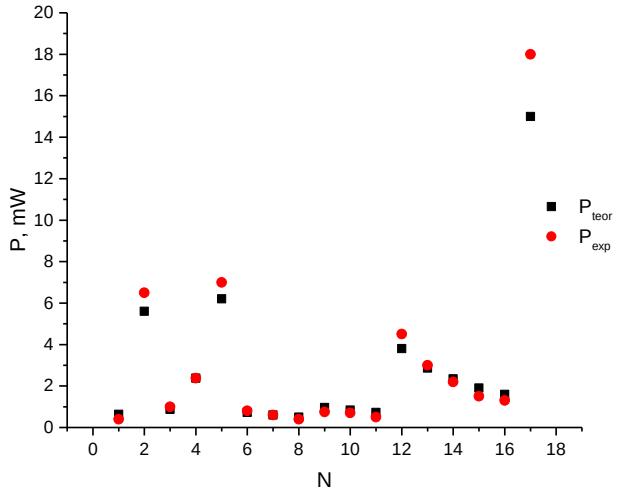

Fig 1. Comparison of calculated P_{teor} power values with experimental P_{exp} values for 17 lasers

Conclusion

The results of the evaluation of the He-Ne laser output power for the case of an active element in the form of a cylindrical tube according to уточненному методу are in good agreement with experimental data. This once again proves the correctness of this method. Currently, the positive discharge column model is becoming more complicated for the case of a polyatomic gas, which will further refine our model.

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SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2022 **Issue:** 04 **Volume:** 108
Published: 17.04.2022 **http://T-Science.org**

Issue Article

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TERRITORIAL ORGANIZATION OF CONSTRUCTION INDUSTRY ENTERPRISES IN THE CONDITIONS OF INNOVATIVE DEVELOPMENT OF THE ECONOMY

Abstract: *The building materials industry occupies a key position in the investment and construction process. The problem of the territorial organization of the industry is relevant and significant. The inadequacy of the location of enterprises and construction sites leads to negative consequences. The article proposes to strengthen the role of authorities in the conceptual solution of this problem, and to reduce the existing negative consequences, use several methods, including strengthening innovation, the application of project management methods, and to ensure a more sustainable development of enterprises in the building materials industry, it is proposed to create an industry cluster.*

Key words: *building materials industry, location, enterprises, and investment attractiveness.*
Language: *English*
Citation: Najimov, I. P. (2022). Territorial organization of construction industry enterprises in the conditions of innovative development of the economy. *ISJ Theoretical & Applied Science, 04 (108),* 358-361.
Soi: http://s-o-i.org/1.1/TAS-04-108-45 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2022.04.108.45
Scopus ASCC: *2215.*

Introduction

It is difficult to overestimate the importance of the building materials industry in the conditions of innovative development of the economy. Evidence of this is the great attention to the development of the industry by the authorities [1] and the recognition of the industry as a "locomotive of the economy" [2].

The territorial organization of enterprises is an urgent industry problem, as noted in the scientific literature [3]. It is obvious that a systematic solution to it will make it possible to use the factors of production more rationally. This concern is extremely relevant for the industry of building materials, products and structures, in which the transport factor is significantly manifested in the delivery of raw materials for processing and in the delivery of finished products to consumers.

The classical, traditional, approach to finding the location of the future enterprise is to find the location of the enterprises so that the total costs for the delivery of raw materials, their processing and production with the subsequent delivery of these products to consumers are minimal per unit of production.

Main part

When solving such difficulties, it is important for building materials enterprises to have information about the availability of raw materials and places of concentrated construction. On its basis, the capacity of the future production (enterprise), the sufficiency of raw materials for the entire service life of the enterprise, and the location are determined. However, there may be cases when this production will not cover future needs. Other negative options are also possible. In the conditions of innovative development of the economy, additional factors appear that affect the location of enterprises engaged in the production of building materials. Obviously, taking them into account will improve the efficiency

of these enterprises, and thus improve the performance of the entire construction industry.

An analysis of the products and structures that have developed in the domestic production of building materials shows that most enterprises operate with low efficiency, and the capacity utilization of a number of enterprises for various reasons does not exceed 50% [4].

Actual tasks of expanding the use of local raw materials, import-substituting, export-oriented products are not being solved actively enough.

An analysis of the reasons for this situation, as well as a number of other significant factors, allows us to state the following conclusion.

1. The current layout of the location of enterprises does not correspond well to modern units of concentrated construction. The transportation distance of products exceeds economically acceptable distances. In the previous administrative system, due to exaggerated pricing, low energy prices, large enterprises were created (for example, precast concrete) with subsequent transportation of products over long distances (hundreds and thousands of km.).

2. The outpacing growth in energy prices has significantly changed the cost structure of the final products of the industries under consideration: the specific costs of extracting and delivering raw materials to factories have increased, and the share of costs associated with the delivery of finished products to consumers has also increased. It should be noted that the discrepancy between the scheme of location of enterprises and the nodes of concentrated construction is a factor that acts simultaneously with an increase in energy prices, that is, the negative impact of both factors is aggravated. Obviously, this leads to a significant increase in prices in the building materials market, affects investment activity, and forces consumers to look for options to replace them with other materials or constructive solutions. This also leads to an increase in the competitiveness of materials, products and structures imported from outside, which, by the way, do not always have high consumer qualities.

3. When assessing the current situation, of course, it should be taken into account that most of the industries engaged in the production of building materials, products and structures are energy-intensive. The technological processes used in them are associated with high temperatures (the production of cement, bricks, building ceramics, etc.) or with long-term heat treatment (for example, the production of precast concrete). Here, too, shortcomings caused by incorrect dislocation of enterprises often appear.

4. It should be added to the series of the above factors that, due to such a layout and an increase in the cost of energy carriers, enterprises, based on market conditions, are forced to reduce the volume of output, and the associated underutilization of capacity leads to an additional calculation per unit of output, due to for maintaining the absolute value of the conditionally constant part of the costs of the enterprise.

5. In the industry, there is accelerated depreciation of the production assets of enterprises, and therefore, enterprises regularly experience a high level of moral and physical depreciation, which also affects the growth of production costs and the decrease in the competitiveness of the products of the enterprises in question [5-7].

The main conclusion from the above is that the situation of enterprises engaged in the production of building materials, products and most of the negatively influencing factors are of an objective nature.

Analyzing the situation under consideration, one should evaluate several effectively taken measures and efforts to improve the state of enterprises, how to use the advantages of market forms and methods of management, not forgetting the role of state bodies.

For clarity, we will give an example of the deployment of building materials enterprises in the Republic of Karakapakstan. One of the features of the industry under consideration is that most of its enterprises are located mainly in the southern regions of the republic. This is especially pronounced in the production of reinforced concrete products (Table 1).

Table 1. Development of production of prefabricated reinforced concret structures and products in Karakalpakstan in the territorial context (m^3)

Regions	2016 y.	2017 y.	2018 y.	2019 y.	2020 y.
Amudarya	3938,5	2109	1081,6	4116,0	4789
Beruniy	11128,5	7061	6275,0	3204,0	5103
Karauzyak	83928,0	49934,6	20396,5	50059,5	3500
Kegeyli	-	-	-	-	-
Kungrad	-	-	-	-	193,7

Kanlikul					
Muynak					
Nukus					
Takhiatash				6480,0	13350
Takhtakupir					
Turtkul	991,0	6158,8	2690,1	2908,9	3049
Khodzheyli	2735,0	2190	4051,0		
Chimbay					
Shumanay					
Ellikkala	1470,0	1620	4500,0	3126,0	2732
Nukus c.	184463,0	60275,16	53856,5	108361,6	191862,5
All regions	288654,0	129348,6	92850,7	178256,0	224579,2

Taking into account that the main part of construction projects is located in the southern regions of the republic, and also that the process of development of the northern territories of the region rich in natural resources, but lacking infrastructure (communications, social and household and other facilities), it can be stated that this situation significantly affects a decrease in the effective development of these promising territories reduces their investment attractiveness and, ultimately, affects the pace of development of the region's economy.

The dynamics of the share of a number of production costs in the industry under consideration also deserves attention (Table 2), it shows a decrease in labor costs from 25.6% to 9.6%. Similarly, the share of costs for depreciation of fixed assets decreased from 10.4% to 7.2%. Considering that there were no significant changes in technology and production, it can be assumed that enterprises were forced to decline to the detriment of updating the material and technical base and reducing the personnel potential of enterprises.

Table 2. Dynamics of the share of wages and depreciation of fixed assets in the building materials industry of Karakalpakstan in % of total production costs

Title of cost	2016	2017	2018	2019	2020
Payment of labor	25,6	25,3	20,0	10,2	9,7
Amortization of corpus	10,4	10,0	10,9	5,5	7,2

It should be noted that the objectively necessary restructuring process carried out earlier gave certain results, but at the same time, enterprises and their management system are slowly mastering market methods of management. This is evidenced by the absence of marketing services in many enterprises or the incomplete performance of marketing functions in the presence of such services; low activity of innovation and investment activity. To a certain extent, this can be explained by the lack of knowledge and experience of managing in market conditions, since, as a rule, managers and line specialists have engineering education for the most part, and the retraining system in the industry is still poorly developed.

A sufficiently powerful and effective direction in the development of the production of building materials, products and structures and ensuring compliance with increased requirements is the creation of joint ventures with the involvement of foreign capital and the excess of progressive foreign technologies in domestic practice. A striking example of this is the development of the production of plastic pipes, concrete pavers, and new roofing materials.

The degree of development of this certainly necessary process depends on the level of socio-economic development, the modern possibilities of the economy. At present, this process may not be widespread and widespread. Along with the release of products necessary for the industry, production is also, of course, a prototype of the enterprises of the near future.

Conclusion

The analysis carried out shows that there is a negative impact from the inadequacy of the location of enterprises to the nodes of concentrated construction.

It is proposed that henceforth this problem should be given more attention by the state, since the

provision of a more optimal organization of the industry should be conceptually decided at the state level. Partial reduction of the negative impact of the discrepancy between the location of enterprises in the industry and the location of construction sites and ensuring the sustainability of development [8] can be solved by several methods, including the intensification of innovation activity in the industry, the clustering of enterprises in the industry [9], and the application of project management that gives effective results [10].

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
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	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2022 **Issue:** 04 **Volume:** 108

Published: 17.04.2022 **http://T-Science.org**

Issue Article

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THE ROLE OF DIGITAL TECHNOLOGIES IN AGRICULTURE

Abstract: *On this paper examines foreign experience in the implementation of digital technologies in smart agriculture, as well as the need to use automated systems in agriculture.*

Key words: *Digital technologies, digitization, smart agriculture, automated systems, technology, agriculture, modernization, automation, water resources, land resources, farmers, consumers, agro-industry, crops, productivity.*

Language: *English*

Citation: Qulmatova, B. A., & Buranova, D. A. (2022). The role of digital technologies in agriculture. *ISJ Theoretical & Applied Science, 04 (108),* 362-365.

Soi: http://s-o-i.org/1.1/TAS-04-108-46 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2022.04.108.46

Scopus ASCC: *1700.*

Introduction

Entrance department.

The emphasis placed by the President on education and the development of the digital economy is an important step towards building a democratic state with strong socio-economic, political and market economy.

Digital technology is a modern form of management. in which the main factor of production and management is a large set of data in digital form and the process of their processing. Applying the results in practice will allow to achieve greater efficiency than traditional forms of management. Examples are various automated production processes, 3D technology, cloud technology. the provision of remote medical services, the production and delivery of products using smart technologies, the storage and sale of a variety of goods. The transition to digital technology means building a whole new kind of social and economic development based on computers and knowledge.

Mobile social networks, cloud technologies, which work with data as a key component of the transition to digital technology. Examples include sensor networks, the Internet of Things, and artificial intelligence technologies.

Digital transformation reaches different levels, and the difference between them is the same as the difference between the two terms - "digitalization" and "digitization". Digitization is the transfer of information from physical to digital media. Examples of digital conversions include e-books, video courses, digital photocopying, and more. There is no change in the structure of information, it is only in electronic form. Digitization is often used to improve an existing business model and optimize business processes. And digitization is the creation of completely new products in digital form. For example. a dynamic animated course or an interactive document interpretation system is digitization.

Department of Methods

It is estimated that by 2050 the population of the planet will reach 9.6 billion, which will require 70% more products than today. However, deteriorating environmental conditions, rising energy costs and declining land productivity are also said to be serious obstacles to food production. These problems can be solved through the management of agricultural activities in a unique way, in particular, the introduction of modern technologies and innovative solutions in the industry, such as the concept of the Internet of Things, in short, "smart" agriculture.

In general, analysts at the Goldman Sachs Group confirm that many countries are actively developing their agriculture through the transition from "analog" to "smart". They predict that with the introduction of new technological solutions, by 2050, agriculture can grow by 70% worldwide. That's almost $ 800 billion. dollars more.

Of course, to work on these we need completely different machines and units. It should be noted that the world's leading manufacturers of agricultural machinery have already begun to define their development strategies based on the need for digitization and automation of agricultural processes. one of the world leaders in the production of techniques. The company has begun to implement on its tractors a set of IoT (Internet of Things) sensors and web interfaces.

Results section

In addition to reducing the impact of the human factor, self-propelled systems installed on tractors and trucks have another important advantage: they allow to reduce grain and fuel theft.

Intelligent farms can use not only driverless vehicles, but also unmanned aerial vehicles equipped with cameras and high-sensitivity sensors. They spend several hours researching agricultural plots, transmitting data collected by cameras and sensors to the farmer, creating an electronic map of the fields in 3D, calculating the standardized vegetation index for effective fertilization of crops, the work being done. storage, land protection and other capabilities. Currently, drones are widely used in agriculture in the United States, China, Japan and Brazil.

The use of sensors and sensors in agriculture is an important step in setting up an intellectual farm. From tens of square kilometers away, they can continuously transmit information about the status of controlled objects through radio channels - mainly soil moisture, temperature, plant health, fuel reserves and other important parameters.

For example, sensors installed at control points are designed to detect basic systems of soil properties. The sensors provide advance information on natural diversity (relief, soil type, light, weather, amount of weeds and pests), diseased plants, and productivity. Sensors and sensors not only help to grow crops, but also to preserve the full harvest. All of this makes for a sensible approach to plant care.

In Chile, sensory irrigation of fruit plantations can reduce water consumption by 70%. Of course, such research is being conducted around the world. For example, NASA, in collaboration with the U.S. Geological Survey, has obtained satellite data on soil moisture in the states.

Discussion.

The consumers of the introduction of intelligent technologies in agriculture are, of course, farmers and farm managers. Technology providers are suppliers. They are responsible for developing innovative applications or mobile applications for consumers, M2M equipment, sensors and tracking devices, communication channels, data analysis tools and other smart solutions. However, not every farm (every farmer) is connected to the internet. Even a small farm needs enough investment to connect to the network. For example, in Africa, where there are 10 million low-income farms, local development Esoko came to the rescue. The development provides farmers with important information about the condition of their farms, the weather, and recommendations for growing crops. The system also includes an eBay online store. Its most popular function is to show farmers the current prices of various products. In this way, they can sell their products at reasonable prices. As a result of this system, the income of private households increased by 12% in two years.

Japan's SoftBank has tested a flight of smart sensors in Colombia. Designed for rice fields, the device measures the nutrient content of soil and water, humidity and temperature, and sends the collected data to each farmer individually via smartphones.

For all its advantages, smart agriculture is still in its infancy. According to Trimble of the United States, only one in four farms in the world uses a database. This is due to financial factors (the establishment of such infrastructure requires a significant initial investment by farmers). In addition, data security, specific farming policies, and the weather make many farmers hesitant.

Of course, the use of technology in agriculture is not new. While the first gas tractors and chemical fertilizers appeared in the 19th century, the use of satellites in agriculture dates back to the second half of the 20th century. John Deere's GPS-sensing tractors have been around for almost two decades.

Long-distance technology is still evolving. Today, web-based devices and services have become more popular, which is why the interest in the Internet of Things is at a record high. Traditional farming methods cannot keep up with the growing demand for food, so farmers are increasingly turning to smart agriculture.

In advanced agricultural systems, various "smart sensors" are installed, depending on the crop and the environment. Examples include pest and disease predators, climate control, temperature, humidity, carbon dioxide levels, nutrient supply, and irrigation equipment. Their use guarantees at least a 30% increase in productivity. In addition, improved systems will be introduced in the production and sales chains of agricultural products, which will eventually allow the collection of large amounts of electronic data. Their storage and analysis can ensure efficient use of water, land and other limited resources, as well as food quality and safety.

The convenience of the electronic system is that even after the harvest, its activities continue in the areas of processing, packaging, cleaning, sorting, delivery and other value chains. In short, Smart Agriculture technologies play an important role in achieving high yields and quality, reducing water consumption and product costs, and planning and forecasting yields. At the same time, the introduction of smart technologies is of interest to the younger generation. This will create new jobs in the industry. But there is also the issue of the organization and use of digital agriculture, which creates a demand for qualified personnel with in-depth knowledge of the industry and modern technical and technological knowledge. First of all, agriculture will need new professionals - programmers, ITo (instrument Internet) engineers, IT specialists.

It can be said that the emergence of many advanced technologies will radically change people's lives. it will lose a number of old professions and create new ones, and will undoubtedly turn the world into a digital world. This digitalization of the world will lead to great changes in all areas, and most importantly, as a result, many new companies will emerge. Not only will it find a place in the digital transformation, but it will also become a leader in the companies that drive it.

Conclusion.

Based on the above, we would like to conclude with the following points. First, digitization is a real reality that is observed everywhere. Examples of the emergence of a "everyone's economy" through the creation of new digital ecosystems are now emerging in various industries.

Second, digitalization is already global - examples of digital ecosystems are available in a variety of industries and companies. We are approaching from year to year that our lives and activities are carried out within these systems.

Third, there are major changes in the economy today that can significantly change market relations between companies. The crackdown is due to the emergence of new "digital ecosystems" that unite all participants in the Internet market - from companies to consumers, products, services and other processes and services. Over the last 50 years, with the development of computer technology, information technology has also grown to some extent.

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
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SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2022 **Issue:** 04 **Volume:** 108
Published: 17.04.2022 **http://T-Science.org**

Issue Article

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SEMANTIC SCOPE OF STATE VERBS IN ENGLISH

Abstract: *Contextual polysemy of state verbs manifests itself in the interrelation of means within different lexical groups, cause-and-effect relationships. In particular, we can say about the verbs of the emotional state that they are a logical continuation of the verbs denoting thinking, their preferred result. After all, the activity of the mind causes the awakening of a certain emotion. Thus, as an additional semantics of verbs in the group of thinking, one can perceive the meaning of causality, that is, the causes of emotional changes.*

Key words: *contextual polysemy, semantic scope, verb, functionality.*
Language: *Russian*
Citation: Tashpulatova, Sh. Z. (2022). Semantic scope of state verbs in English. *ISJ Theoretical & Applied Science, 04 (108),* 366-370.
Soi: http://s-o-i.org/1.1/TAS-04-108-47 ***Doi***: https://dx.doi.org/10.15863/TAS.2022.04.108.47
Scopus ASCC: *1203.*

СЕМАНТИЧЕСКИЙ ОБЪЕМ ГЛАГОЛОВ СОСТОЯНИЯ В АНГЛИЙСКОМ ЯЗЫКЕ

Аннотация: *Контекстуальная полисемия глаголов состояния проявляется во взаимосвязи средств внутри разных лексических групп, причинно-следственных связях. В частности, о глаголах эмоционального состояния можно сказать, что они являются логическим продолжением глаголов, обозначающих мышление, их предпочтительный результат. Ведь деятельность ума вызывает пробуждение определенной эмоции. Таким образом, в качестве дополнительной семантики глаголов в группе мышления можно воспринимать значение причинности, то есть причины эмоциональных изменений.*

Ключевые слова: *контекстуальная полисемия, семантический объём, глагол, функциональности.*

Введение

Ценность языка определяется степенью функциональности входящих в него средств. Причина в том, что многофункциональность, в том числе полисемантические свойства слов, повышает выразительность языка, освобождая его от сложности употребления. Не секрет, что сегодня английский язык как средство международного общения занимает прочные позиции по сравнению с другими мировыми языками. Это связано с тем, что с точки зрения грамматической структуры английский язык имеет сильное аналитическое преимущество перед такими родственными языками, как французский или немецкий языки. Можно утверждать, что несложная грамматическая конструкция, например, относительная простота категорий лица-числа, падежей заложила благоприятную почву для распространения английского языка. Наряду с грамматической простотой, многофункциональность словарного содержания также важна для популярности языка. Это связано с тем, что изучающие язык по мере того, как осваивают слова на иностранном языке, считают особым преимуществом то, что каждый элемент словарного запаса (лексики) может передавать разные значения в разных контекстах. Такая полисемия даёт возможность изучающему язык быстро развить способность бегло говорить. В то же время полисемантическое содержание словаря может мотивировать учащегося к пониманию культурных аспектов этого языка, его

специфического тона. Налицо все условия для признания английского языка средством универсального общения. То есть данный язык имеет грамматически простую структуру, а структура словаря гладкая, гибкая и многофункциональная.

Лексемы можно разделить на две группы в зависимости от их полисемантических свойств. В первом случае полисемия проявляется в наложении языковых элементов поверх значения лексемы. В этом случае, хотя основное лексическое значение не меняется в разных контекстах, в это основное значение в речи загружается дополнительная грамматическая и лексическая семантика. Такую полисемию можно назвать языковой многозначностью. Большинство глаголов состояния отличает языковая многокомпонентность лексического значения. Языковую многокомпонентность глагола состояния можно доказать следующим образом:

Table 1.

Лексема	Морфологическая категория	Синтаксическая функция	Общая архисема	Группа лексического значения
POSSES	глагол (время, наклонение, лицо-число)	предикатив	состояние	бездействие
	Состав лексического значения			
	лексическое значение	значение формы		стилистическое значение
	обладать	продолжитель ность, эгоцентризм		нейтральный

Лексема	Морфологическая категория	Синтаксическая функция	Общая архисема	Группа лексического значения
DESIRE	глагол (время, наклонение, лицо-число)	предикатив	состояние	чувство
	Состав лексического значения			
	лексическое значение	значение формы		стилистическое значение
	хотеть, вожделеть	продолжитель ность, беспрерывность		положитель ное

Лексема	Морфологическая категория	Синтаксическая функция	Общая архисема	Группа лексического значения
ENVY	глагол (время, наклонение, лицо-число)	предикатив	состояние	чувство
	Состав лексического значения			
	лексическое значение	значение формы		стилистическое значение
	завидовать	продолжительность, незаконченность		отрицательное

Лексема	Морфологическая категория	Синтаксическая функция	Общая архисема	Группа лексического значения
RESPECT	глагол (время, наклонение, лицо-число)	предикатив	состояние	чувство
	Состав лексического значения			
	лексическое значение	значение формы	стилистическое значение	
	уважать	беспрерывность	положительное	

Лингвистическую полисемию следует понимать отдельно от речевой многокомпонентности значения лексемы. Семема лексемы может включать в себя различную семантику устойчивых выражений. Выше стиль, стилистическая окраска и основное лексическое значение были классифицированы вместе как лексико-стилистическая семантика. Лексема также начинает выражать семы различных категориальных функций, когда встречается в речи. Но все это не языковая полисемия, а речевое явление, сформировавшееся под осадой и влиянием других средств речи. Речевые явления, конечно, находятся под влиянием других связанных явлений. Это демонстрирует гибкость и прагматическую полноту языковых возможностей.

Во втором случае лексема имеет несколько лексических значений, имеющие языковой характер, эти значения существенно отличаются друг от друга и образуют отдельные языковые синонимические ряды. Такая полисемия называется лингвистической многозначностью. Можно сказать, что большая часть глаголов состояния в английском языке обладает свойством лексической многозначности. Однако эту многозначность можно разделить на несколько категорий.

Первая категория слов выражает другие значения как средство длительного аспекта. Например, глагол «*to have*» в длительном аспекте означает «ужинать» *(having dinner)* или «прекрасно проводить время» *(having great time)*, а глагол *«to think»* в длительном аспекте означает «планировать» *(thinking of visiting new mall)*. Однако не все глаголы состояния могут изменять свое лексическое значение через грамматическую форму. Теоретически глаголы состояния в английском языке отличаются от глаголов действия тем, что они не используются в длительном аспекте[1]. Действительно, использование эмоциональных и реляционных глаголов в длительном аспекте создает семантический диссонанс. Тем не менее, мы становимся свидетелями употребления в речи и в образцах художественной литературы эмоциональных глаголов в длительном аспекте, при котором сохраняется их семантика состояния. Примеры*: From all we can find out, Geoffrey* ***is hearing*** *these voices in his head pretty much all the time. (Knight D. Reasonable world) – Из всего, что мы можем узнать, Джеффри почти все время* ***слышит*** *эти голоса в своей голове. (Найт Д. Разумный мир); But I didn't think it was the brightlanders Miz* ***was fearing****. (Gerrold D. Dancer in the dark) – Но я не думаю, что Миз* ***боялась*** *светлоземцев. (Герролд Д. Танцор в темноте); I* ***am loving*** *the weather, and bed is cooler with just me in it. (Reynolds P. The surface of Earth) – Мне* ***нравится*** *погода, и в постели прохладнее, когда в ней только я.(Рейнольдс П. Поверхность Земли).*

Когда слова анализируются в качестве граммемы, они показывают знаки, указывающие на действие, но при семантическом подходе в контексте содержания они все еще представляют состояние. Отсюда следует, что вывод о том, что признак «не употребляется в длительном аспекте» является абсолютным признаком, отличающим глаголы состояния от глаголов действия, ошибочен и неуместен.

Некоторые глаголы состояния употребляются как существительные без каких-либо аффиксальных изменений, т. е. одна лексема относится к разным грамматическим категориям. Такие глаголы можно также назвать высоким уровнем полисемантизма и низким уровнем омонимии - полифункциональностью (это одно из явлений, ожидающих своего изучения в нашем

[1]См. об этом: Landman F. The Progressive // Natural Language Semantics. - 1992. - № 1. - P. 1-32.

языкознании). «Символ и значение, форма и содержание не всегда полностью совпадают. Так как если ровно один символ или форма выполняет несколько функций, то одно и то же значение представляется несколькими символами (формами). Это явление сформировалось как теория лингвистической асимметрии»[2]. Примеры*: Now Mark's secret lay buried beneath the years, when* ***fear*** *of revealing the truth had muted his love for his brother. (Moats D. The incident) – Теперь тайна Марка погребена за годами, когда* ***страх*** *раскрыть правду приглушил его любовь к брату. (Моутс Д. Инцидент); Part of our values include the* ***belief*** *in selfsufficiency. (Torgersen B. Purytans) – Частью наших ценностей является* ***вера*** *в самодостаточность. (Торгерсен Б. Пуритане); Food lost its* ***taste****, the air its odor of sand and wind. (Malcolm G. What Do You Do?) – Еда потеряла свой вкус, воздух — запах песка и ветра. (Малкольм Дж. Что ты делаешь?); He would need to earn their* ***respect*** *before they trusted him. (Quinn P. Conquered by a Highlander) – Ему нужно будет заслужить их уважение, прежде чем они поверят ему. (Куин П. «Покорённая горцем»).*

В целом лексемы можно разделить на две группы по их многозначным свойствам. В первом случае лексических значений лексемы несколько, и они существенно отличаются друг от друга. Такая полисемия называется многозначностью. Например: *The way I* ***see*** *it, you're not even close you're on low-impact duty. (McGoran J. Deadout) – Я* ***вижу****, что вы не то чтобы подойти к проблеме, вы даже не поняли её. (Макгоран Дж. Мертвец); When I* ***see*** *her empty bed or look at her chair at our dinner table and realize I'm starting to forget what she looked like. (Dockrell C. Glencliff) – Когда я* ***вижу*** *ее пустую кровать или смотрю на её стул у нашего обеденного стола, я понимаю, что начинаю забывать, как она выглядела. (Доркелл С. Гленклиф).*

Второй вид лексической полисемии – это влияние или средства других единиц речи на значение лексемы, проявляющееся в наложении новых значений. В этом случае, хотя основное лексическое значение не меняется в разных контекстах, в это основное значение загружаются дополнительные грамматические и лексические семы. Хотя количество многозначных глаголов в первой группе ограничено, большинство глаголов состояния отличается многокомпонентным лексическим значением.

Когда лексема выражается словом, она представляет значение в конкретном тексте, увеличение количества лексических значений, добавление к основному значению различных сем вызывает исторический процесс из-за социальных, а также языковых изменений. По мере добавления новых значений старые семы могут ослабевать, опускаясь до нуля. В результате значение слова постепенно претерпевает полную трансформацию. Новая сема лексемы изначально воспринимается как контекстуальное значение, которое впоследствии может стать постоянным составным компонентом лексического значения лексемы.

Контекстуальная полисемия глаголов состояния проявляется во взаимосвязи средств внутри разных лексических групп, причинно-следственных связях. В частности, о глаголах эмоционального состояния можно сказать, что они являются логическим продолжением глаголов, обозначающих мышление, их предпочтительный результат. Ведь деятельность ума вызывает пробуждение определенной эмоции. Таким образом, в качестве дополнительной семантики глаголов в группе мышления можно воспринимать значение причинности, то есть причины эмоциональных изменений. Например, когда глагол *to forget,* “забыть” употребляется в контексте текста в значении «забыть трудности / боль / испытание», состав семы “забыть” дополняется еще одним контекстуальным эма – «наслаждаться забвением», «почувствовать облегчение», то есть значением эмоционального глагола *to relief.* Если глагол *to forget* употребляется в значении «забыть важную информацию / новость / мероприятие / задание и т.п.», то значение этого глагола само собой косвенно вбирает в себя и такие семы, как *to be frustrated, to be annoyed,* то есть, “нервничать”, и даже “гневаться”.

В отличие от глаголов группы мышления, глаголы состояния, выражающие интуицию, представляют собой результат какого-либо события, а не причинно-следственную связь, казуативность. Потому что органы чувств человека активизируются в результате определенного явления. Поэтому в глаголах мышления скрыта сема «причины эмоционального состояния», а в глаголах восприятия отражается результат окружающих событий.

«Мир — это целая система. Его системность заключается в том, что это взаимозависимое, взаимообусловленное целое. Эта целостность имеет свойство делиться на меньшие целые. Элементы, составляющие окружающий нас мир, группируются в классы на основании некоторого общего знаменателя, а элементы, составляющие класс, выделяются в этом классе по своим

[2]Косимова Н. Лисоний белги асимметрияси, унинг система ва структурада намоён бўлиши\\International Scientific Journal http://www.inter-nauka.com/

отличительным признакам»[3]. Парадигма глаголов состояния отличается от других арен последовательностью системно-структурных отношений. Хотя полисемия лексемы является только языковым явлением, т. е. свойством, не связанным с речью, она свидетельствует о высокой степени выразительности и функциональности языковых средств. Однако некоторые глаголы выражают и состояние, и действие без каких-либо грамматических изменений. Что именно оно означает, можно понять из контекста речи. Такая полисемантика латентна в языковом отношении и проявляется только в речи. В английском языке количество лексем и значений, которые они представляют, часто непропорциональны, и почти все лексемы в определённой степени многозначны. Глаголы состояния тоже отличаются обилием как лексической полисемантики, так и грамматической семантики. Полисемия глаголов состояния является одним из явлений, обеспечивающих масштабность экспрессивности английской речи.

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
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	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2022 **Issue:** 04 **Volume:** 108

Published: 17.04.2022 **http://T-Science.org**

Issue Article

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THE NATURE OF THE PROBLEM OF INFORMATION SUPPLY OF AGRICULTURAL ENTERPRISES OF THE REPUBLIC OF UZBEKISTAN AND WAYS TO SOLVE IT

Abstract: *This article examines the problem of information support of agricultural enterprises, issues to be addressed in the field, the organization of information and consulting services.*

Key words: *information, information supply, agriculture, information and consulting service.*

Language: *English*

Citation: Toshpulatov, D. Sh. (2022). The nature of the problem of information supply of agricultural enterprises of the Republic of Uzbekistan and ways to solve it. *ISJ Theoretical & Applied Science, 04 (108),* 371-373.

Soi: http://s-o-i.org/1.1/TAS-04-108-48 ***Doi***: https://dx.doi.org/10.15863/TAS.2022.04.108.48

Scopus ASCC: *1100.*

Introduction

In today's digital economy, there is a need to establish a direct link between agricultural producers and the system of information on production, new technologies, innovations, world experience, which is necessary for agriculture. Providing agriculture with the necessary, science-based information is one of the tasks of agricultural research institutes and universities. In this regard, the Decree of the President of the Republic of Uzbekistan "On approval of the Strategy" Digital Uzbekistan-2030 "and measures to implement it" and the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan "On measures to develop the agro-industrial complex and digitization system in agriculture" tasks are set.

Agricultural enterprises can be considered as the information supply of the information system consists of two interconnected parts. It consists of information available outside of agricultural enterprises and internal information of enterprises. The first part of them is the republican and regional enterprises, and the second is the departments of the enterprise management structure. The development of a system of introduction of "smart agriculture" technologies will increase … the effectiveness of interaction between participants and the state through the transition to digital data exchange, reducing the number of reports [1].

Both systems are designed to perform specific functions and tasks, which are based on the mutual exchange of information. The development of information and communication technologies has increased the ability to automate the process of collecting, storing, processing and transforming information.

Today, the provision of information to the agricultural sector, in particular its enterprises, is experiencing the process of its development as a branch of the economy. Of course, despite the fact that our country has accumulated some experience in this area, the scientific and methodological basis of the problem has not been developed in terms of meeting the requirements of today's digital economy and modern information and communication technologies.

Analysis of scientific sources and practical results shows that [2, 3, 4, 5] there are two approaches to the introduction of "smart agriculture" technology in agricultural enterprises. The first is to study the experience of foreign countries, process them and adapt them to the conditions of Uzbekistan, and the second is to develop our own model, taking into account the specifics of Uzbek agriculture, as well as the extensive use of best international practices. This allows us to constantly improve the system, saving costs for its creation and operation. In addition, the potential of qualified national staff will be formed.

With this in mind, it is necessary to formulate the concept of providing information services to agricultural enterprises.

The Agricultural Knowledge Introduction Service simultaneously defines the concept of an advisory service. It is a qualified service that engages agricultural producers in solving and analyzing the practical problems they face, as well as helping them to learn and apply the experience of others.

In the Resolution of the President of the Republic of Uzbekistan dated on August 17, 2019 No. ПҚ - 4421 the task is to introduce a system of "information and consultation center - department - agricultural producer" to identify and eliminate systemic problems in agricultural production through …the University …information and consultation centers on "…Application of innovative resource-saving technologies in agriculture", "smart agriculture" and the introduction of digital agricultural technologies.

Information and consulting services systems provide services for conducting and organizing business activities in the field of agriculture, marketing research, development programs, and market research. Today, consulting service is an intellectual service related to solving a complex problem in the field of management and organizational development of the enterprise. In the digital economy, expert advice on enterprise management and development will be needed.

Counseling services are often provided in the form of a project as part of a problem, which involves the development of management decisions and the application of the recommendations given by the consultant. The following types of consulting services are available: expert advice; process counseling and instructor.

In expert counseling, the consultant assesses the situation (problem), develops decisions and makes recommendations. The client's role here is to provide the consultant with the necessary information and evaluate the outcome.

In process counseling, the consultant always works with the client and evaluates his ideas and recommendations. Together he analyzes the problem and prepares a decision. The role of the consultant is mainly to support the ideas, evaluate the decision made in the process of working with the client, bring them into a certain system and prepare recommendations.

In consulting as a tutor, the consultant not only collects ideas and analyzes the decision, but also provides the client with relevant theoretical and practical information in the form of lectures, seminars, manuals, etc., and prepares the ground for their emergence.

Taking into account the above, the creation of information support of agricultural enterprises of the republic includes the solution of a wide range of organizational tasks, namely:

- ensure strong cooperation with information support organizations and government agencies, universities, research institutions and be fully focused on the needs of a particular agricultural producer;

- Specialists of information and consultation centers, researchers of research institutions, professors and teachers of higher education institutions should be united for a common purpose, and in the organization of their work should include the role of consultant and researcher, consultant and teacher;

- to set before the staff of regional information support organizations the issues of ensuring the adaptation and linking of research results to the conditions of certain regions. This, in turn, will lead to the effective operation of research institutes, universities and information and consulting centers with highly qualified specialists.

Today, the provision of information and consulting services to agricultural producers in the country has become very relevant. The main means of providing information services to all categories of enterprises and consumers in agriculture are:

1) Publications of higher education institutions and research institutes that train specialists in the field of agriculture;

2) Information products of consulting, information infrastructure institutions working for agriculture;

3) Periodicals and special publications and recommendations.

If we analyze the form of information products and the content of services provided to agricultural producers, the information of research institutes is numerous and is distinguished by the fact that they are adapted to the conditions of production, science and management. If the information and consulting services in agriculture of the republic are digitized with the use of modern information and communication technologies on these principles, the level of service to agricultural producers will be improved and commercial information will be provided in a convenient form.

The provision of information and consulting services includes the definition of the purpose of the enterprise, the current collection and processing of information for management decisions, control over the deviation of the current economic indicators of the enterprise, and, most importantly, the preparation of recommendations for optimal management decisions.

The interaction between information and consulting services organized in agriculture and agricultural producers is constantly evolving, improving and gaining new perspectives. Information support services help agricultural producers to maximize profits and capture the market by producing products that meet market requirements. Financing of information and consulting services is carried out through the establishment of specialized non-

governmental information and consulting service centers. Information and consulting services, regardless of their appearance and funding, should not only advise on important issues, but also study the issues of improving the management of the agro-industrial complex, including agricultural enterprises in a market economy.

To assess the results of economic and business activities of the enterprise, it is not enough to compare the achieved results with the previous ones. It is necessary to take into account the state of the internal and external environment of the enterprise, as well as objective economic laws. Boundaries between networks are disappearing, vertical connections are being replaced by horizontal ones, and the integration of different stages and tasks of processing is evolving.

Thus, not all issues of organization of information support services for agricultural enterprises can be studied by quantitative methods. This is due to the fact that its quality aspect is not sufficiently systematized. The subject of information support as a system consists of organizations providing information and consulting services, and the object consists of agricultural enterprises. Issues to be addressed in the information and consulting services will help:

- is designed for the current situation and assists in the organization of competitive production;
- promotes the improvement of property relations and increase the efficiency of land use;
- seeks modern methods and technologies for its implementation within the adopted long-term plans;
- Co-operates in the development of a business plan that identifies and solves production problems;
- substantiates the purpose of the developed investment projects, the possibility of reducing credit in the developed business plans.

A distinctive feature of the methodological approach to the information and consulting service is the identification of problems in agriculture, the search for information on its solution, recommendations for application, the organization of training for agricultural producers to use new information and communication technologies. It is also important to determine who and what needs to be done in the system, and how formal and informal connections between system elements are ensured.

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
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SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2022 **Issue:** 04 **Volume:** 108

Published: 17.04.2022 **http://T-Science.org**

Issue Article

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APPLICATION OF PHOSPHATE STARCH AS INK THICKENER

Abstract: *In the work possibility of starch modification by phosphatic compounds and study of applying of obtained preparations, as thickeners in printing by active dyes on cotton fabrics is learned. Let's mark, that the degree of thickening is various for various concentrations of polymer and 4 % of masses reaches maximum rating for solutions with concentration of starch. It's detected, that the effect of thickening starts at some extreme value of concentration of modifying agent.*

Temperature effect on rheological behavior of chemically treated solutions of starch is also investigated. The time of deformation relaxation of polymers is decrease with decreasing of characteristic viscosity, and, therefore, at the given degree of polymerization at a decrease of concentration of polymer in solution.

Key words: *dynamic viscosity, modifier, yield point, degree of thickening, concentration, thickening.*

Language: *English*

Citation: Nazarov, S. I., Razzokov, Kh. K., & Shirinov, G. K. (2022). Application of phosphate starch as ink thickener. *ISJ Theoretical & Applied Science, 04 (108),* 374-379.

Soi: http://s-o-i.org/1.1/TAS-04-108-49 ***Doi***: https://dx.doi.org/10.15863/TAS.2022.04.108.49

Scopus ASCC: *1600.*

Introduction

The relevance of the search for new ways of chemical, physical and mechanical modification of starch in order to improve the technological properties and reduce the consumption of raw materials is due to the wide use of this natural polysaccharide in various industries, in particular in the textile industry for thickening printing inks [1, 2, 3].

Due to the widespread use of active dyes in textile printing, it has become difficult to provide the textile industry with appropriate thickeners. Therefore, in many scientific studies, work is being carried out to find new types of thickeners that fully replace the classic thickener for active dyes, such as sodium alginate [4–12]. The scarcity and high cost of this thickener currently make this topic relevant. Work is carried out mainly in the direction of replacing sodium alginate with water-soluble synthetic high-molecular compounds. However, so far not a single product has been produced on an industrial scale in our Republic. Starch continues to occupy a leading position among thickeners, and various forms of starch are also used, which have significantly improved properties compared to natural ones.

The purpose of this work was to study the possibility of modifying starch with phosphate compounds and to study the use of the obtained preparations as thickeners in printing with active dyes on cotton fabrics.

In table. 1 shows the values of the maximum and minimum dynamic viscosities of starch solutions of various concentrations before (hini) and after (hA) their chemical treatment with phosphate compounds.

Table 1. Effect of Modifier Concentration on Dynamic Viscosity and Yield Strength of Starch Phosphate Solutions

C, % mas.		Dynamic viscosity, Pa·s				Yield strength, Pa		Degree of thickening $h_A / h_{исх}$
		original		after modification				
		$Д_г$=1,3 c^{-1}	$Д_г$=1310 c^{-1}	$Д_г$=1,3 c^{-1}	$Д_г$=1310 c^{-1}	original	after modification	
4	10	0,145	0,043	2,167	0,064	110	265	13,8
	15	0,166	0,051	2,440	0,076	230	310	12,3
	20	0,183	0,058	3,275	0,089	315	375	12,1
	25	0,194	0,067	3,640	0,105	380	420	12,0
5	10	0,936	0,076	13,760	0,126	420	490	11,45
	15	1,015	0,094	14,210	0,137	470	520	10,25
	20	1,235	0,126	16,720	0,154	435	615	9,40
	25	1,464	0,154	18,915	0,166	520	690	8,16
6	10	1,672	0,215	26,440	0,185	540	750	7,60
	15	1,865	0,236	26,810	0,197	575	785	5,43
	20	2,025	0,254	26,925	0,203	710	810	5,21
	25	2,345	0,287	27,315	0,218	890	920	5,05
7	10	2,815	0,364	28,175	0,226	1030	1150	4,25
	15	3,140	0,396	28,240	0,237	1070	1230	3,68
	20	3,870	0,417	28,570	0,241	1090	1290	3,21
	25	4,365	0,445	28,683	0,244	1110	1340	3,07
8	10	9,750	0,463	29,640	0,245	1170	1430	2,60
	15	10,215	0,485	29,870	0,276	1220	1520	2,43
	20	10,840	0,496	29,915	0,283	1260	1610	2,26
	25	11,250	0,514	30,116	0,296	1320	1660	2,14

As can be seen from the table, the formation of starch phosphates in a heterogeneous liquid-phase system causes a significant increase in the maximum dynamic viscosity (Dg = 1.3) and yield strength (□T) for all studied concentrations. The minimum viscosity does not change significantly. Note that the degree of thickening is different for different polymer concentrations and reaches its maximum value for solutions with a starch concentration of 4% wt.

It is known that under the action of shear deformations with low velocity gradients on systems formed by anisotropic particles, such particles can be completely misoriented, and under the action of high-speed shear, they can be completely oriented. It was of interest to study the effect of modifier concentration on the rheological behavior of starch solutions of various concentrations. On fig. 1 shows the dependences of the maximum dynamic viscosity of starch phosphate solutions with concentrations of 4; 5 and 6% wt. at different modifier concentrations. As can be seen from the figure, the thickening effect begins at a certain critical value of the modifier concentration.

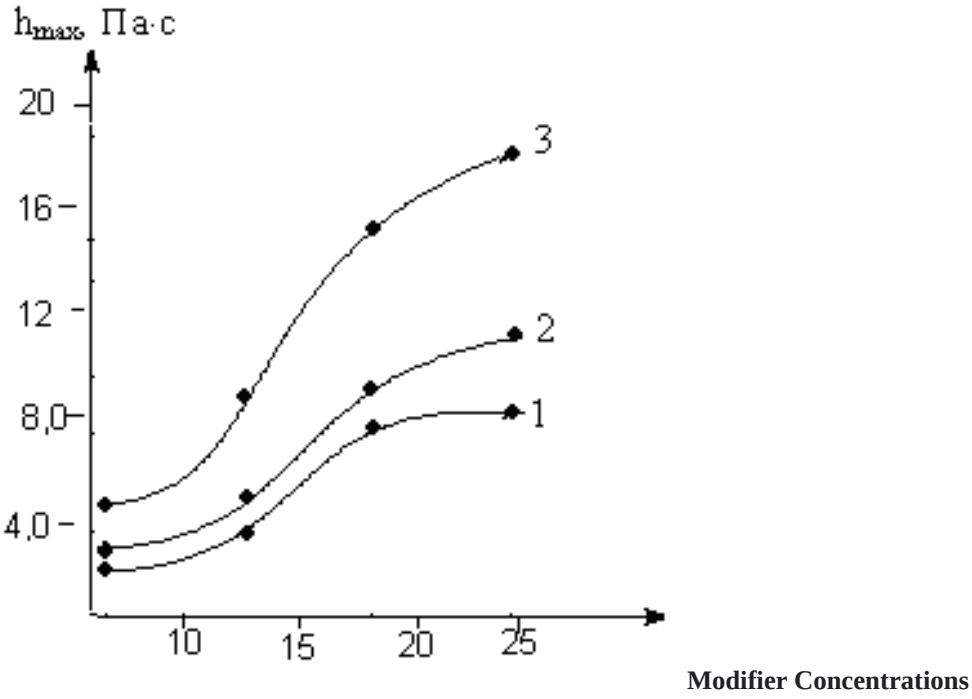

Fig. 1. Flow curves of 4% aqueous solutions of starch: initial (1), processed in an activator at n = 3500 without a modifier (2) and in the presence of a modifier (3)

This fact can be explained as follows. The nature of the rheological curves for aqueous solutions of starch is determined by the ratio in the solution of the molecularly dissolved part of the polymer and the amount of the colloidal dispersed phase. It can be assumed that the action of shear forces causes the destruction of the molecular network of entanglements, the orientation of released macromolecules, and the appearance of new supramolecular formations. The shift-induced phase transformations in the system lead to a change in the quantitative ratio of the molecularly dissolved and colloidal-dispersed phases in favor of the latter. An increase in the proportion of the colloidal-dispersed phase and an increase in the interaction between oriented particles determines the characteristic, almost vertical arrangement of the flow curves of chemically thickened starch solutions. In other words, the chemically thickened starch solutions exhibit a more pronounced viscosity anomaly than the initial solutions. This rheological behavior of solutions is undesirable when used as thickeners for printing compositions.

The authors have made attempts to chemically modify starch thickeners. For this purpose, special chemical modifiers were selected that prevent the dense packing of starch chains deployed in the flow, and thereby reduce the proportion of the colloidal dispersed phase. In this case, the system, as can be seen from Fig. 3 becomes more plastic, the slope of the yield curve decreases (Fig. 3, curve 3). Modifiers were introduced into cold starch solutions before their chemical treatment in the amount of 0.1-0.2%. There is reason to believe that the chemical treatment of the solution in this case not only ensures a good distribution of the modifier and a high level of homogeneity of the entire system, but also catalyzes the chemical interaction of the low molecular weight modifier with the polymer.

In this work, the effect of temperature on the rheological behavior of chemically treated starch solutions was investigated. On fig. 4 shows the flow curves of starch solutions treated at 20, 40 and 60 °C.

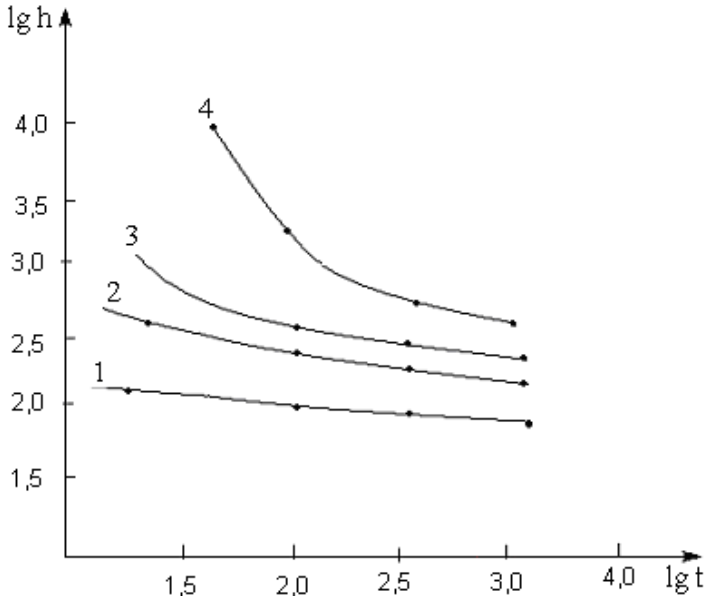

Fig. 2. Flow curves of 4% aqueous solutions-suspensions of starch subjected to chemical treatment at various concentrations of the modifier: 1(10); 2(15); 3(20); 4(25)

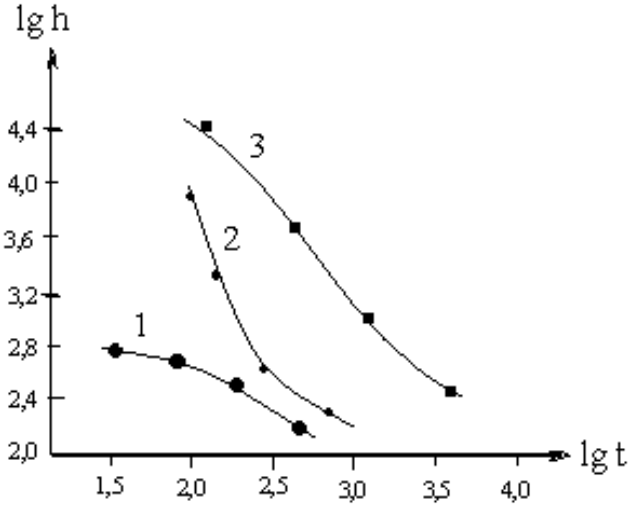

Fig. 3. Flow curves of 4% aqueous solutions of starch: initial (1), processed in an activator at n = 3500 without a modifier (2) and in the presence of a modifier (3)

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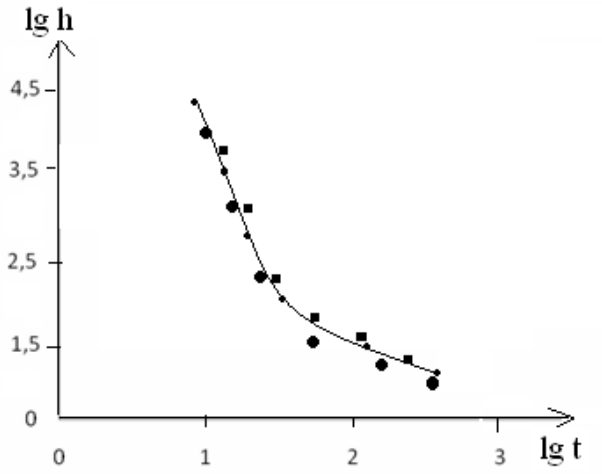

Fig. 4. Dependences lgh = f(lgt) for 4% aqueous solutions of starch treated in an activator at different temperatures: 20 °C(•), 40 °C(■) and 60 °C (○)

As we see from fig. 4, a change in the process temperature within the specified limits does not cause a noticeable change in the rheological behavior of the treated solutions. This experimental fact is difficult to explain theoretically. Perhaps this is due to the compensation of various effects that affect the probability of orientation processes in opposite ways: an increase in temperature leads to an increase in the mobility of macromolecules, on the one hand, and to a weakening of fixing hydrogen bonds, on the other. In practical terms, the experimentally obtained independence of the thickening effect from temperature eliminates the need to exercise strict control over the temperature of the processed mixture when preparing thickeners from starch by a chemical method. Chemically modified starch-based thickeners have been tested in the printing of cotton fabrics with active dyes.

Table 2. Influence of the nature of the thickener and the method of its modification on the technical results of cotton fabrics when printed with bright red ostazine ZB-Ash

Thickening name	Way modifications	Thickener concentration, g/l	Intensity coloring K/S	Color fastness, score			The degree of fixation of the active dye, %
				to laundry N 2	к поту	to dry friction	
Starch silicate		70	17,0	4/4/4	4/4/4	5	82,5
Starch	non-modified	80	16,2	4/4/4	4/4/4	5	68,0
Phosphate starch	chemically modified	40	22,8	5/5/5	5/4/5	5	92,0

In table. Figure 2 shows for comparison the technical results of printing cotton fabrics with bright red ostazine ZB-ASh using various thickeners for the preparation of printing inks. The use of starch-metasilicate and unmodified starch does not allow to achieve a high degree of fixation of the active dye and,

accordingly, bright, saturated colors of textile materials. This is due to the ability of these thickeners to enter into chemical interaction with the dye is reduced due to the screening effect of the hydrocarbon radical of the chemical modifier. In addition, by increasing the thickening capacity, 2 times less thickener is applied to the fabric, and, consequently, a smaller amount of dye during washing.

Thus, as can be seen from the data in the table, the replacement of traditional thickeners with starch chemically modified with phosphate compounds leads to a significant increase in the degree of dye fixation, an increase in color intensity, a decrease in the rigidity of the printed material, and an improvement in the strength characteristics of patterned colors of textile materials.

Based on the studies carried out, we can recommend the chemically modified thickeners developed by us for industrial use in the processes of printing textile materials.

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
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SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2022 **Issue:** 04 **Volume:** 108
Published: 18.04.2022 **http://T-Science.org**

Issue Article

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TOPIC OF "ĪMĀN" (FAITH) IN SA'D AL-DĪN AL-TAFTĀZĀNĪ'S VIEW

Abstract: *One of the brightest representatives of the Second Eastern Renaissance of the Middle Ages is al-Allāma Sa'd al-Dīn al-Taftāzānī al-Ḥanafī (722-792/1322-1390). He was a scholar in the fields of Arabic grammar (al-naḥw), Arabic morphology (al-ṣarf), eloquence (balāğa) uṣūl al-fiqh, and furū' al-fiqh (ḥanafī, shāfiʿī, and mālikī), logic, ʿaqīdah, ḥadīth, tafsīr, geometry, astronomy, and other similar sciences. In particular, more than fifty works of the allāma on various subjects have been identified.*

Sa'd al-Dīn al-Taftāzānī occupies an important place in the development of the teachings of Māturīdī. The work of the scholar in this area can be divided into three categories: writing of books, an analytical summary of the various views of previous scholars on a specific creedal issue, and additional substantiation of the issues on a scientific basis. In particular, these three cases are reflected in the views of the scholar on the topic "īmān" (faith).

Despite this topic being the basis of the creed, the scholar dwelled on it in detail. Indeed, through a comparative analysis of the theological works of Sa'd al-Dīn Taftāzānī and "Kitāb al-Tawḥīd" of Abū Manṣūr al-Māturīdī (243-332/857-944), it is advisable to determine the scholar's contribution to the development of the teachings of Māturīdī on the topic "īmān". This article focuses on this topic.

Key words: *ḥanafī, māturīdī, ash'arī, fiqh, īmān (faith), kalām, ʿaqīdah (creed), manṭīq (logic), dalīl (evidence), ijmālī (total), tafṣīlī (detailed), taqlīdī (imitative) and taḥqīqī (investigative).*

Language: *English*

Citation: Palvanov, O. B. (2022). Topic of "ĪMĀN" (faith) in SA'D AL-DĪN AL-TAFTĀZĀNĪ'S view. *ISJ Theoretical & Applied Science, 04 (108)*, 380-387.

Soi: http://s-o-i.org/1.1/TAS-04-108-50 ***Doi***: https://dx.doi.org/10.15863/TAS.2022.04.108.50

Scopus ASCC: *1200.*

Introduction

One of the brightest representatives of the Second Eastern Renaissance of the Middle Ages is Sa'd al-Dīn al-Taftāzānī. His full name is Mas'ūd ibn Qāḍī Fakhr al-Dīn 'Umar ibn Mawlā 'Aẓīm Burhān al-Dīn 'Abd Allāh ibn Imām Rabbānī Shams al-Ḥaqq Shams al-Dīn Qārī al-Samarqandī al-Harawī al-Taftāzānī al-Khurāsānī al-Ḥanafī (722-792/1322-1390) [4: 190; 2: 241; 1: 734; 17: 471], he was born in the village of Taftāzān near the city of al-Nasā (now Ashgabat, Turkmenistan) in Khorasan.

Sa'd al-Dīn al-Taftāzānī was a great scholar in the fields of nahw, sarf, balaghat (eloquence), uṣūl al-fiqh, and furū' al-fiqh (ḥanafī, shāfiʿī, and mālikī), logic, ʿaqīdah, ḥadīth, tafsīr and other sciences [4: 190; 22; 23; 24]. His teknonym of the scholar is "Abū Sa'īd" [8:304].

He is known in the Islamic world not only as "al-Sheikh Sa'd al-Dīn" [18: 389-390], "al-Ustāz" (The teacher) [7: 223], "al-Imām al-kabīr" (senior imam), "Ustaz al-Ulama al-mutaahhirin wa sayyid al-fuzalo al-mutaqaddimin, mawlana sa'd al-milla wa al-dīn, mu'dil mizan al-ma'qul wa al-manqul, muftih agsan al-furū' wa al-usul" (later scholars mentor and master of the next noble scholars, the happiness of the nation and religion, the rectifier of the criteria of transmission and reason, the discoverer of the branches of method and furū') [8: 303-304], "al-Imām al-allāma" [2: 241], "Sa'd al-milla wa al-din" (the happiness of the nation and religion), "Sa'd al-imām al-allāma al-faqih al-adib al-ḥanafī" (the blessed of the Imam of the Ḥanafī fiqh writers), "'Ālim al-Sharq" (the scholar of the East), "ḥabr al-ummah, shams al-a'immah" (the scholar of the Ummah, the sun of the imams) [9: 446], "al-'Allāma al-thānī" (the second scholar) and "al-Muḥaqqīq al-samadanī" [6: 49], but also is considered as a scholar who has made significant contributions to world science with his many encyclopedic works on

the exact sciences and the humanities, such as geometry, mathematics, philosophy, logic and literature.

Every issue in the science of ʿaqīdah is directly related to the subject of "īmān" (faith), which is the basis of the creed. Therefore, the essence of the matter is that, first of all, it is a critical study of the views of such sects of the past as the Khawārij, the Muʿtazila, the Murjiʾah, the Jahmīya, and the current as the Ḥizb al-taḥrīr, the Wahhābī. On the other hand, it is a scientific analysis of the conformities and differences between the teachings of Ashʿarī and the teachings of Māturīdī within the Ahl al-Sunnah on the subject.

In particular, the open mendacity of the views of such groups as the Khawārij, the Muʿtazila, the Murjiʾah, the Jahmīya, the Ḥizb al-taḥrīr, the Wahhābī in this regard is pointed out. Despite, the teachings of Māturīdī and the teachings of Ashʿarī having a common foundation in terms of intellectual and source basis, there are might be detected certain differences between their views. Due to this, nowadays the teachings of Ashʿarī are wrongly accused of being "fanatical" teaching by some minorities. Indeed, this aspect of the issue has to be clarified through scientific analysis.

This topic is important not only in history but also in the current context of today's globalization in the entire Muslim world and particularly in Uzbekistan. In particular, this situation can be observed in the integration process of nations and regions in the century in which the scholar lived. Especially, the interaction between the people of countries such as Khorāsān, which was united to the country by Amir Timur, mainly in the teachings of Ashʿarī, and the population of Transoxiana (Mā Warāʾ al-Nahr) in the teachings of Māturīdī has intensified. Obviously, it was a necessity to provide scientific evidence which is proof enough to demonstrate the unity of the two doctrinal teachings and such measures were of vital importance to keep the peace within the society. In particular, there is no doubt that Saʿd al-Dīn al-Taftāzānī, as a scholar, had a certain positive influence on these processes. Therefore, it is worthwhile to study to which extent "īmān" (faith) is covered in the works of Saʿd al-Dīn al-Taftāzānī.

Also, a comparative study of the issue of "īmān" (faith) with Saʿd al-Dīn al-Taftāzānī's books and Abū Manṣūr al-Māturīdī's "Kitāb al-Tawḥīd" as a primary source is important in scientifically revealing the scholar's contribution to the development of the teachings of Māturīdī. In the process of studying the scholar's heritage, it was found that nine issues directly related to this topic were highlighted. These are:

1. Definition of "īmān" (faith). Commenting on this topic, Saʿd al-Dīn al-Taftāzānī first explained in detail the lexical and the Sharīʿa (i.e. its meaning as a term in Islamic jurisprudence) meanings of the word "īmān". In particular, he said that the word "īmān" literally means "affirmation" (al-taṣdīq). That is, to obey the judgment of the reporter, to accept it, and to recognize it as truthful". He then elaborated on the grammatical aspect of the term, quoting evidence from verses (āyāt) and ḥadīths [14: 288, 11:95, 16: 175, 12: 113]. He also emphasized that the scholars of Ahl al-Sunnah who lived before him used the words "knowing" (al-ma'rīfah), "knowledge" (al-ʿilm), or "creed" (al-iʿtiqad) instead of "affirmation" (al-taṣdīq) and that the meaning of these expressions was "confirming knowledge" (al-ʿilm al-taṣdīqī) [12: 113].

Saʿd al-Dīn al-Taftāzānī stated that the Sharīʿa meaning of the word "īmān" is a complete "affirmation" of the heart and believing in the obligation of what was sent to the Prophet (peace and blessings of Allah be upon him) by Allah [12: 113].

2. The total (al-ijmālī) **and detailed** (al-tafṣīlī) **"īmān" (faith).** The issue is whether a person believes in all Sharīʿa rulings without knowing their names in general, or whether he believes in the Sharīʿa rulings by quoting their names one by one. The essence of the issue is whether in the given cases the faith of both parties is correct, or only "detailed faith" is acceptable. In this regard, Saʿd al-Dīn al-Taftāzānī said, "The general confirmation alone is sufficient to fulfill the obligation of faith. It is a "total īmān" and its level is not inferior to the status of "detailed īmān" in the essence. However, he argued that "detailed īmān" is not only more abundant but more perfect in terms of the abundance of affirmations than "total īmān" [14:290, 299]. The statement of the scholar was also supported by commentators on "Sharḥ al-ʿAqā'id al-Nasafīyah".

Indeed, the importance of this idea becomes clear when it is considered that in reality, those who do not know the faith are more numerous than those who know the faith in detail. Otherwise, the quality of "muʾmin" (believer) would have to be removed from the majority of people.

In "Kitāb al-Tawḥīd", the issues of "total īmān" and "detailed īmān" are not mentioned [3:538].

3. The imitative (al-taqlīdī) **and investigative** (al-taḥqīqī) **"īmān" (faith).** Saʿd al-Dīn al-Taftāzānī, in his "Risālah al-ḥudūd", defines the word "al-taqlīd" as "accepting a statement without proof" [13:10]. According to this, it is clear that acknowledging the rulings of the Sharīʿa matters without evidence is "imitative īmān" and knowing them with evidence is "investigative īmān".

Saʿd al-Dīn al-Taftāzānī elaborated on the issue, and in the introduction to the analysis of the matter, also emphasized that "imitative īmān" was denied by al-Sheikh Abū al-Ḥasan al-Ashʿarī, the Muʿtazila and most of the Mutakallimūn. He also cited their arguments that "imitative īmān" is not permissible, and refuted them one by one. Indeed, the scholar stated that they had no substantiated narrative evidence, and thus emphasized that their views were incorrect [12:119-120]. Here, too, the scholar had to

fulfill two tasks: first, to justify the fact that the teachings of Ashʿarī are from the Ahl as-Sunnah in the context of the same issue, and secondly, that the views of the Muʿtazila are false. The scholar responded to their claims from the point of view of reality: "indeed, affirmation (al-taṣdīq) can be ignorant and uneducated, or vice versa. In particular, we believe in all the processes of the Day of Judgment without knowing their circumstances and characteristics".

He also stated that the Companions and the imāms, scholars, and caliphs who lived after them had introduced Muslim rulings to the imitative believer. In this regard, he cited the following verse and ḥadīth as evidence: the verse 94 of Sūrah al-Nisā: "And do not say to those who offer you greetings of peace, "You are no believer!" and the words of the Prophet (peace and blessings of Allah be upon him): "Whoever prays like us and faces our Qibla and eats our slaughtered animals is a Muslim and is under Allah's and His Apostle's protection. So do not betray Allah by betraying those who are in His protection" [16: 218-224].

In "Kitāb al-Tawḥīd", the issue of imitative (al-taqlīdī) and investigative (al-taḥqīqī) "īmān" (faith) is not mentioned [3: 538]

4. The pillars (arkān) **of "īmān" (faith).** The next issue is about the pillars of faith, which are fundamental and important aspects of the subject. Saʿd al-Dīn al-Taftāzānī summed up a lot of information on this topic, gave all its practical and probable causes, and gave a question-and-answer conclusion. In similar respects, it can be observed that the scholar's contribution to the development of the teachings of Māturīdī was significant. He divided the views expressed on the pillars of "īmān" (faith) up to the time he lived into four categories, and analyzed the arguments of the proponents of each of those views, elaborating as follows:

1-category. "Īmān" is a name for "affirming (al-taṣdīq) by heart". And, it is the affirmation by the heart in terms of the necessary knowledge of what the Prophet (peace and blessings of Allah be upon him) brought from Allah. Many scholars agree with this view.

According to the Shīʿa sect, Jahm ibn Ṣafwān al-Samarkandī and Abū l-Ḥusayn al-Ṣāliḥī, "īmān" is the name for "knowing" (al-maʾrīfah). Al-Imām al-Ashʿarī was also inclined to it.

2-category. "Īmān" is a name for confession by the tongue. In addition, "knowing of the heart" may be required. In particular, according to al-Riqashī, "īmān" is a "confession" (al-iqrār) that requires the "knowing" (al-maʾrīfah). From the point of view of Yaḥyā ibn Saʿīd al-Qaṭṭān (d. 198/814), confirmation is required, and for the Karrāmī it was only a "confession" (al-iqrār) without conditions.

3-category. "Īmān" is a name for "affirmation by heart and confession by the tongue". Many accomplished scholars have advanced this view. A recital was narrated on this subject from Abū Ḥanīfa. Some scholars used the words "knowing" (al-maʾrīfah), "knowledge" (al-ʿilm), or "creed" (al-iʿtiqad) instead of the word "affirmation" (al-taṣdīq).

4-category. "Īmān" is a name for "the affirmation by heart, the confession by the tongue, and the deeds of the body". According to the Khawārij, a person who abandons the deeds has committed heresy and becomes a disbeliever. According to the Muʿtazila, if a person abandons the deeds, he will leave "īmān", but he will remain between the two positions without entering disbelief (kufr). However, according to the salaf scholars, all al-Imām of the Ahl al-ḥadīth and the most of the Mutakallim, a person who abandons the deeds does not leave "īmān", but is prevented from entering Paradise directly and even if he falls into Hell first, will not remain there forever. In particular, this was narrated by al-Imām Mālik, al-Imām al-Shāfiʿī, and al-Imām al-Awzāʿī.

At this point, Saʿd al-Dīn al-Taftāzānī said there was an obvious problem with the fourth category. Indeed, there is a reason for such a viewpoint.

Firstly, the adherents of the teachings of Māturīdī belong to the third category. Secondly, in the fourth category, the views of the teachings of Ashʿarī of the Ahl as-Sunnah on the subject seem to be the same such the sects as the Khawārij and the Muʿtazila. Accordingly, it requires a scientific distinction between the teachings of Ashʿarī and the views of other misguided sects.

The scholar initially analyzed and concluded the solution to this problem in a question-and-answer manner, based on a logic method. He raised three questions by saying "how can "īmān" not be ruined by the loss of its pillar", "how can a person enter Paradise without something that is described as the name of "īmān" [16: 177], "how can the whole not be ruined by the loss of its part" [12: 113]. He then answers these questions: "Indeed, "īmān" is associated only with the affirmation (al-taṣdīq) which is the essence, the basis, of entering the Paradise or with the affirmation and the confession (al-iqrār)" [16: 180], "the purpose of including deeds in the pillar of "īmān" is that deeds are the basis of deliverance and the perfect savior", "the purpose of including deed in the condition of "īmān" is perfect "īmān", "although confession (al-iqrār) is included in the condition of "īmān", it does not impair the essence of "īmān" by its disappearance due to its additional pillar" [12: 113, 116].

In "al-Talvīḥ", the scholar approached the problem from the point of view of uṣūl al-fiqh. In particular, he described "al-rukn" as "al-rukn is some part of a certain thing" and divided it into two types, "al-aṣlī" (base) and "al-zaʾid" (excess). Then, he defined "al-rukn al-zaʾid" (excess pillar) as "al-rukn al-zaʾid is the part in which, with its disappearance, the verdict of integrity is preserved from the point of view of al-Shāriʿ". According to the same rule, al-Imām al-Shāfiʿī said that the inclusion of deeds in the

pillar of "īmān" is from the point of view of "al-za'id" (excess). Hence, on this basis, the teachings of Ash'arī differed from other superstitious views.

Sa'd al-Dīn al-Taftāzānī noted that the misguided sects such as the Khawārij and the Muʿtazila considered the deeds as the fundamental pillar of "īmān" [10:273-275]. The scholar used the method "burhān al-tumāniʿ" to prove that deeds are not the fundamental pillar of "īmān". That is, he cited evidence from the Qurʾān and hadiths that a believer may be a sinner. For example, according to misguided categories such as the Khawārij and the Muʿtazila, deeds are the fundamental pillar of "īmān" and a Muslim who abandons them leaves the religion. It is clear from this that the scholar analyzed the ideas in the context of the matter and concluded first with the rule of "al-Uṣūl" and then with the narrative evidence. The scholar says that "īmān" is the work of the heart and can only be true with it, quoting the following verses and hadiths as narrative evidence:

أُولَٰئِكَ كَتَبَ فِي قُلُوبِهِمُ الْإِيمَانَ.

Translation of meanings. Those - He has decreed within their hearts faith. (Sūrah al-Mujādilah, 22).

وَقَلْبُهُ مُطْمَئِنٌّ بِالْإِيمَانِ.

Translation of meanings. While his heart is secure in faith ... (Sūrah al-Naḥl, 106).

وَلَمْ تُؤْمِنْ قُلُوبُهُمْ.

Translation of meanings. But their hearts believe not. (Sūrah al-Māʾidah, 41)

وَلَمَّا يَدْخُلِ الْإِيمَانُ فِي قُلُوبِكُمْ.

Translation of meanings. (Because) faith has not entered your hearts. (Sūrah al-Ḥujurāt, 14)

The Prophet (peace and blessings of Allah be upon him) said:

يَا مُقَلِّبَ الْقُلُوبِ ثَبِّتْ قَلْبِي عَلَى دِينِكَ.

Translation. "O Controller of the hearts make my heart steadfast in Your religion".

The Prophet (peace and blessings of Allah be upon him) said:

ولا يدخُلُ النَّارَ مَنْ كَانَ فِي قَلْبِهِ مِثْقَالُ حَبَّةٍ مِنْ خَرْدَلٍ مِنْ إِيمَانٍ.

Translation. "… And no one will enter Hell who has faith in his heart equal to the weight of a grain of mustard seed".

When Usāmah ibn Zayd (May Allah be pleased with him) killed a man who said, "لَا إِلَٰهَ إِلَّا ٱللَّٰ" (Lā ʾilāha ʾillā-llāh). The Prophet (peace and blessings of Allah be upon him) said to him, "Did you tear his heart so that you learned…?".

Then, the scholar provided a rational argument in this regard, concluding that if a person confesses his "īmān" by tongue and does not affirm it by heart, he would be a hypocrite and would not be a believer in the sight of God, even though he is considered a believer in the eyes of people. Indeed, he emphasizes that this idea belongs to Abū Manṣūr al-Māturīdī and that the Qurʾān and the ḥadīths support him [3: 471]. In this regard, the views of both sides are common. In addition to the above, Sa'd al-Dīn al-Taftāzānī quoted the scholars such as al-Imām Shams al-A'imma al-Sarakhsī (d. 490/1097), Fakhr al-Islām al-Bazdawī (400-482/1010-1090), and Najm ad-Dīn Abū Ḥafṣ an-Nasafī saying that "īmān" is the affirmation (al-taṣdīq) and the confession (al-iqrār).

Sa'd al-Dīn al-Taftāzānī answered this issue as follows: "īmān" is the affirmation (al-taṣdīq), and the confession (al-iqrār) is a condition for the fulfilling the Sharī'a rulings in this world. Because the affirmation (al-taṣdīq) is an inner (invisible) action, so a certain sign is needed to know it. If a person affirms "īmān" by the heart and does not confess it by the tongue, he is a believer in the sight of Allah, even though he is not considered a believer in the eyes of people [14: 294]. The scholar has proved this view through many verses, ḥadīths, and intellectual thoughts. In particular, he commented on the issue, quoting verse 29 of Sūrah al-Ra'd and verses 9-10 of Sūrah Al-Ḥujurāt. In addition, the scholar has argued that faith is a condition of worship: if a person affirms, confesses, and dies before he has time to perform the deeds, the Ijmāʿ (consensus) of the Ummah (the Muslim community) has decided that the person has died as a believer [16: 177].

Al-Taftāzānī stated that deeds are a condition of "īmān" (faith) as the views of the Muʿtazila, and provided strong evidence against their eight opinions on the subject. With this evidence, he defended the teachings of Māturīdī [16: 177]. Al-Taftāzānī refuted the views of the Muʿtazila and the Khawārij on the subject saying, "In our opinion, a believer who commits a grave sin is still a believer". In his arguments and denials, the scholar also used the work of the famous ḥanafī-māturīdī scholar Abū al-Muʿīn Maymūn ibn Muḥammad an-Nasafī's "Tabṣirat al-Adillah". The conclusion to be drawn from this is that deeds are not a condition of "īmān".

In "Kitāb al-Tawḥīd", emphasis is placed on substantiating with narrative and intellectual evidence that affirmation (al-taṣdīq) by heart is the main pillar of "īmān". There are also more denials to the Karrāmiyyah than to the Muʿtazila and the Khawārij [3: 418, 471-479]. The scholar's coverage of this issue is distinct from that of the "Kitāb al-Tawḥīd" in the way that his views on the subject are divided into specific groups, the opinions, and arguments of each category are presented and refuted, and the opinions of prominent scholars of the teachings of Māturīdī are analyzed.

5. Whether or not "īmān" (faith) **increases or decreases.** Commenting on this issue, Sa'd al-Dīn al-Taftāzānī said that the Ash'arītes, al-Imām Al-Shāfiʿī, and The Muʿtazila considered the possibility of the faith to "increase or decrease". The scholar also said that the reason for the controversy was related to the definition of "īmān" and the view that the faith of the common people was not strictly equal to the faith of the Prophets.

For example, the scholar had to substantiate that the teachings of al-Imām Al-Shāfiʿī and the teachings

of Ashʻarī were from the Ahl as-Sunnah and that the views of the Muʿtazila were false. To this end, the scholar cited their views and arguments one by one and responded to them with narrative, intellectual, and historical evidence. In particular, he wrote in "Maqāṣid al-ṭālibīn fī ʻilm uṣūl al-dīn": "Faith increases and decreases according to the appearance of the Book (the Qurʾān) and the Sunnah (the ḥadīths). However, most scholars considered that faith would neither increase nor decrease. Because, faith is an affirmation that has reached the limit of great certainty, and it is indistinguishable (i.e., affirmation does not increase or decrease). If faith is considered a name for "obedience" (al-ṭāʻa) then there is a difference in it (that is, by doing more or fewer deeds). Hence, the disagreement on this issue occurred according to the definition of faith. But, while it is permissible not to deviate from the faith as a result of abandoning the deed, this might damage the perfection of the faith, but that does not concern the essence of the faith. The scholar, on the other hand, concluded that faith is "affirmation by heart" and that it neither increases nor decreases [16: 210-211]. He said that the proponents of the idea of "increasing and decreasing of faith" relied on intellectual and narrative evidence in their views. In particular, the following can be cited from the arguments of the proponents of this view:

وَإِذَا تُلِيَتْ عَلَيْهِمْ آيَاتُهُ زَادَتْهُمْ إِيمَانًا.

Translation of meanings. When His verses are recited to them, it increases their faith. (Sūrah al-ʾAnfāl, 2).

هُوَ الَّذِي أَنْزَلَ السَّكِينَةَ فِي قُلُوبِ الْمُؤْمِنِينَ لِيَزْدَادُوا إِيمَانًا مَعَ إِيمَانِهِمْ.

Translation of meanings. It is He Who sent down tranquility into the hearts of the Believers, that they may add faith to their faith. (Sūrah al-Fatḥ, 4).

The scholar responded to their arguments in three points:

1. An increase in faith means that the faith is sustainable and stable, lasting a long period and time in the servant.

2. An increase in faith means a succession of things to be believed. The Companions (God be please with them) were believers in total (al-ijmāl). After one "farḍ" (duty) came another duty. They believed in each "farḍ" (duty) individually.

3. The increase of faith is the increase of the effects of faith and the shining of its light in the heart. Indeed, this light increases with doing righteous deeds and decreases with doing sinful deeds [16: 213-214].

Abū Ḥanīfah's commentary on the evidence for the increase of faith in the Qurʾān and the Sunnah is narrated in the scholar's "Sharḥ al-ʻAqāʾid al-Nasafīyah". According to him, the Companions (may Allah be pleased with them) were believers in total. After one "farḍ" (duty) came another "farḍ" (duty). They believed in each "farḍ" (duty) individually. As a result, the faith also increased in proportion to what was believed. This situation is inconceivable after the time of the Prophet (peace and blessings of Allah be upon him) [14: 296]. Because the things that are to be believed are completely finished. Now people believe them all at once. The conclusion is that the essence of faith neither increases nor decreases.

This issue is not mentioned in "Kitāb al-Tawḥīd".

6. Concepts of īmān (faith) **and Islām.** The issue of whether īmān and Islām are one-dimensional concepts or different-meaning concepts have been debated between the Ahl as-Sunnah and the heretical sects. Although there is a clear, correct solution to the fact that the īmān and the Islām have the same meaning, the debate about it can still be observed among the misguided sects today. In particular, Saʻd al-Dīn al-Taftāzānī has emphasized this matter in all his books on the creed. In particular, he mentioned that scholars had agreed that the concepts of faith and Islam are synonymous and that there was narrative evidence, such as verse 85 of Sūrah Ali ʻImrān.

Initially, the scholar gave a logical argument that a person is not condemned as a muʾmin (a believer) but not a Muslim or a Muslim but not a muʾmin (a believer) in the Sharīʻa. From this view, it is clear that every believer (muʾmin) is a Muslim and every Muslim is a believer (muʾmin). To support his opinion, he also quoted from books of the most famous ḥanafī-māturīdī scholars such as Abū al-Muʿīn Maymūn ibn Muḥammad an-Nasafī's "Tabṣirat al-Adillah" and Nūr al-Dīn Aḥmad ibn Maḥmūd al-Ṣābūnī's (d. 580/1184) "al-Kifāyah fī al-hidāyah".

The scholar also cited historical evidence that in the time of the Prophet (peace and blessings of Allah be upon him) the fourth (i.e., Muslim) was not used concerning people, except for the terms "believer" (muʾmin), "unbeliever" (kāfir) and "hypocrite" (munāfiq). He divided the opinions of those who considered these concepts synonymous into two parts. Within these two categories, the scholar cited verses 84, 85, 102 of Sūrah Ali ʻImrān, verse 7 of Sūrah al-Ḥadīd, verses 14, 17 of Sūrah al-Ḥujurāt, verse 53 of Sūrah al-Rūm and verses 22, 35 of Sūrah al-Aḥzāb as the narrative evidence, and said that there were many similar other verses and interpreted them. In addition, he said that the Ḥashawiyya and some Muʿtazila have divided faith and Islam into separate concepts and that they have cited verse 14 of Sūrah al-Ḥujurāt as evidence for their views on the matter:

قَالَتِ الْأَعْرَابُ آمَنَّا قُلْ لَمْ تُؤْمِنُوا وَلَكِنْ قُولُوا أَسْلَمْنَا.

Translation of meanings. Say, "We have attained faith". Say [unto them, O Muhammad]: "You have not [yet] attained to faith; you should [rather] say, "We have [outwardly] surrendered" - for [true] faith has not yet entered your hearts.

The scholar interpreted this verse as meaning, "'Islām, which is emphasized in the Sharīʻah, does not exist without the īmān (faith). The meaning of the

Islām in this verse is not inward obedience but outward obedience by uttering the word of testimony without the confirmation of īmān (faith)". These sects also cited the following ḥadīth as evidence for their views:

The Prophet (peace and blessings of Allah be upon him) said: "Islam means that you should testify that there is no God but Allah, and Muhammad is Allah's Apostle, that you should observe prayer, pay zakat [19:10; 20:203; 21:4537], fast during Ramadan, and perform Hajj to the house (i.e., Kabah) if you have the means to go".

The scholar commented on this fact, saying, "The meaning of Islam in this ḥadīth is that the reflections and signs of Islam are these five things". The scholar cites the following hadith as evidence for this view:

Narrated Abu Jamra: "… The Prophet (peace and blessings of Allah be upon him) ordered them to believe in Allah Alone and asked them, "Do you know what is meant by believing in Allah Alone?". They replied, "Allah and His Apostle know best". Thereupon the Prophet said, "It means: To testify that none has the right to be worshipped but Allah and Muhammad is Allah's Apostle; To offer prayers perfectly; To pay the Zakat (obligatory charity); To observe fast during the month of Ramadan, And to pay al-Khumus (one-fifth of the booty to be given in Allah's Cause)".

At the same time, the scholar said, "Whoever proves the difference between faith and Islam is asked the following question: "What is the ruling on one who believes and does not surrender or who surrenders and does not believe?" which led to the logical idea. In the conclusion of this opinion, however, he stated that if the same person proved one of them in this case without the other, the falsity of his opinion would be exposed [14: 306; 16: 206-210; 12: 117-118].

In addition, the scholar also gave a logical argument: "whoever proves that faith and Islam are different will be asked such a question: "What is the judgment of one who believes, does not embrace Islam, or embraces Islam, does not believe?". In concluding this view, the scholar stated that if that person proves one of them in this case without the other, the falsity of his opinion will be revealed [14:306, 16:206-210, 12:117-118].

Al-Imām Abū Manṣūr al-Māturīdī did not classify the concepts of faith and Islam in his "Kitāb al-Tawḥīd". In the book, the refutations are described in general terms, not concerning the name of particularly misguided sects. Indeed, the issue is covered with more use of verses of Qurʾān. But the book does not mention the above ḥadīth quoted by Sa'd al-Dīn al-Taftāzānī as evidence. However, this ḥadīth is one of the most important proofs that clearly shows the meaning of these two concepts [3: 491-499].

7. Exception (al-istiṯnāʾ) **in "īmān"** (faith)**.** The exception in faith is that a person says, "I am truly a believer" (أنا مؤمن حقاً) or "I am a believer if Allah wills" (أنا مؤمن. إن شاء الله إن). In this regard, Sa'd al-Dīn al-Taftāzānī, from the standpoint of the doctrine of the teachings of Māturīdī, argued and debated with the followers of the teachings of Ash'arī and the heretical sects. All views on the issue can be summarized in four general categories [5: 350[b]].

The scholar, on the other hand, divided the views of those who say that it is permissible to make an exception in faith into three categories and analyzed them based on logic, without narrative evidence [16: 214-217].

In his concluding the matter, the scholar put forward the following opinion: If a person affirms and confesses, it is correct for him to say, "I am truly a believer" in order for his faith to be realized. In this case, it is not appropriate for that person to say, "I am a believer, if Allah wills". If a person refers to doubt in his faith from the word "ʾIn shāʾ Allāh", he will be a disbeliever.

It is better not to say, "I am a believer, if Allah wills" even if the word "ʾIn shāʾ Allāh" means the following:

To be polite to Allah; to refer matters to the will of Allah; doubts about whether a person will remain a believer in the end and in the future, not in the present and the situation; blessing the remembrance of Allah; considering that the believer is not pure in his self and is surprised by his condition. Because it leads to self-doubt [14: 308-311]. With this last thought, the scholar proved that the followers of the teachings of Ash'arī are also from the Ahl as-Sunnah.

Al-Imām Abū Manṣūr al-Māturīdī, in his "Kitāb al-Tawḥīd", did not classify the views on the issue, but expressed them in general terms.

In this book, only the names of such sects as the Muʿtazila, the Khawārij, and the Ḥashawiyya are mentioned, and refutes them.

In the given denials, the verses of the Qurʾān were used more than the rules of logic. The general conclusion is that exception is not permissible in faith [3: 486-491].

8. Whether "īmān" (faith) **is created or not.** The history of this issue dates back to the 8th century (The hijrī calendar, the 2nd century). In particular, although it is considered to be directly related to the fact that the Qurʾān was created or not, it is essentially the subject of the believer's actions. It is probable that it was quoted by Sa'd al-Dīn al-Taftāzānī in the same chapter and approached it in terms of the actions of the person. So, he did not dwell on this issue on the subject of faith. It should be noted that the scholar described the issue only in "Sharḥ al-Maqāṣid". This suggests that the importance of this issue is less than that of other issues on the subject. Otherwise, the scholar would have quoted it in all his books on the field. In particular, the scholar said: "in the sight of

you (that is, the ḥanafī-māturīdī), faith is created by Allah, and from the point of view of the Muʿtazila, faith is created by the person. In some books of fatwas, it is stated that whoever claims to be a creature of faith is a disbeliever. How do you understand that?". In response, the scholar stated Abū al-Muʿīn Maymūn ibn Muḥammad an-Nasafī's opinion, thereby supporting him [15: 236-237].

Al-Imām Abū Manṣūr al-Māturīdī, in his "Kitāb al-Tawḥīd", states that "faith is a goodness, a blessing, a right path and an adornment for its owner, and all the qualities that characterize faith are created". He quotes verses 7, 14 of Sūrah al-Ḥujurāt and verse 41 of Sūrah al-Māʾidah as evidence for his views on the matter. The scholar said that the place of faith is the heart and that it is the work of the soul. Then, he has simply stated that what is not created is unlikely to exist in the created heart [3: 486]. This means that the scholar approached the matter in terms of the quality of the faith.

9. Is the "īmān" (faith) **of ordinary people equal to the faith of the Prophets or not?** This issue was also debated between the teachings of Māturīdī and the teachings of Ashʻarī. In "Sharḥ al-ʻAqāʾid al-Nasafīyah", Saʻd al-Dīn al-Taftāzānī gives the following view on this issue: "some scholars have said that we can never agree with the opinion that "the truth of affirmation does not accept increase and decrease". Perhaps the truth of affirmation differs in terms of strength and weakness. Certainly, the affirmation of some people from the Ummah is not the same as the affirmation of the Prophet (peace and blessings of Allah be upon him)" [14: 300]. The answer to this question is given by the scholar in his book "Sharḥ al-Maqāṣid": "Indeed, the affirmation is that clarity, which is valid about the whole thing. It is not possible to accept the distinction of affirmation as it is necessary and theoretically accurate" [16: 211].

This issue is not mentioned in "Kitāb al-Tawḥīd" [3: 538].

CONCLUSION

In conclusion, Saʻd al-Dīn al-Taftāzānī summarized nine issues related to the subject of īmān (faith). It was found that four issues of them, such as total faith and detailed faith, imitative faith and investigative faith, whether faith increases or decreases, and whether the faith of ordinary people and the faith of prophets are equal or not, were not mentioned in al-Imām Abū Manṣūr al-Māturīdī's "Kitāb al-Tawḥīd".

The scholar categorized the views of the sects in this regard into certain logical categories, and refuted their arguments with narrative and mental evidence, as the situation required. In the process, he emphasized that the teachings of Ashʻarī was also from the Ahl as-Sunnah. In this respect, his works differ from the book "Kitāb al-Tawḥīd".

Hence, on the one hand, Saʻd al-Dīn al-Taftāzānī made a significant contribution to the development of the teachings of Māturīdī by composing such works as "Sharḥ al-ʻAqāʾid al-Nasafīyah", "Maqāṣid al-ṭālibīn fī ʻilm uṣūl al-dīn", "Sharḥ al-Maqāṣid" and "Ghāyat tahdhīb al-kalām fī taḥrīr al-manṭiq wa-al-kalām" and on the other hand, he enriched this teaching with his methods of classifying and proving creedal subjects.

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SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2022 **Issue:** 04 **Volume:** 108

Published: 18.04.2022 **http://T-Science.org**

Issue Article

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LEARNING ENGLISH THROUGH ELECTRONIC DATABASE

Abstract: *In the period of learning English learners often feel difficulty in acquisition vocabulary (words) of specialty such as engineering because its relevant terminology only characterizes the features of engineering in one area of learning. Therefore, students studying at this area of expertise have to know how to master English in technical world. ESP (English for Specific Purposes) covers subject matter and language acquisition and the ways of interpretation. Besides, adult learners need to perceive the meaning of each words occurring in the written contexts accordingly. What's more, Electronic database is very essential to provide learners with sufficient knowledge to carry out their performance in listening, reading, writing and even speaking.*

Key words: *ESP learning, ESP learners, electronic database, video supplies.*

Language: *English*

Citation: Suyarova, M. E. (2022). Learning English through Electronic Database. *ISJ Theoretical & Applied Science, 04 (108),* 388-390.

Soi: http://s-o-i.org/1.1/TAS-04-108-51 ***Doi***: https://dx.doi.org/10.15863/TAS.2022.04.108.51

Scopus ASCC: *3304.*

Introduction

ESP is now being essential course to enhance initial knowledge of learners, increasing their language potential in subject matter. Furthermore, ESP courses are being important not only in the local areas but also in the international one. It gives learners a stimulus to be motivated in learning specialty with new data in English. What's more, ESP courses are mainly based on content data such as reading because adult learners start interpreting the specialty in other language with their initial knowledge in L1 as it may increase their indent of interaction in this sphere which is not usually used in daily life. Furthermore, the era we live in digitalized in all sphere which we cannot live without, and our work performance focused on computer programs those ease our job to calculate, type write in all languages, having access to internet resources, consequently, gives us to use multifunction in excel, power-point, and Microsoft word. Excessive working at the computer leads to development of cognitive skills of learners, but on the other hand, it may impair their interpersonal skills as well. The visual screen we use in every day is TV set which involves us watching and listening movies, documentaries, broadcasting, news around the globe, those all strengthen our knowledge in acquiring English language. Moreover, this paper indicates the advantages of electronic data supplies and ideas of scholars according to it.

The main features of electronic database

Nowadays, it is universally acknowledged that teaching and learning a foreign language cannot be reduced to the direct teaching of linguistic skills like phonology, morphology, vocabulary, and syntax. According to the scholars such as Facione, 2013, Halpern, 2003 statement, English teachers face an unequalled challenge: bridging the gap between traditional teaching aimed at developing all kinds of students' listening, reading, speaking and writing, skills, and communicative teaching focused on contextualizing. Furthermore, media literate students are supposed to have a better understanding of the information that they receive and are more likely to consider its quality and assumptions). They are capable of making judgments and grounding them in good reasons. They are flexible in their thinking and capable of revising their own judgments when confronted with new ideas and information. As a result, they are better able to succeed when faced with

problems that have complex causes or debatable solutions

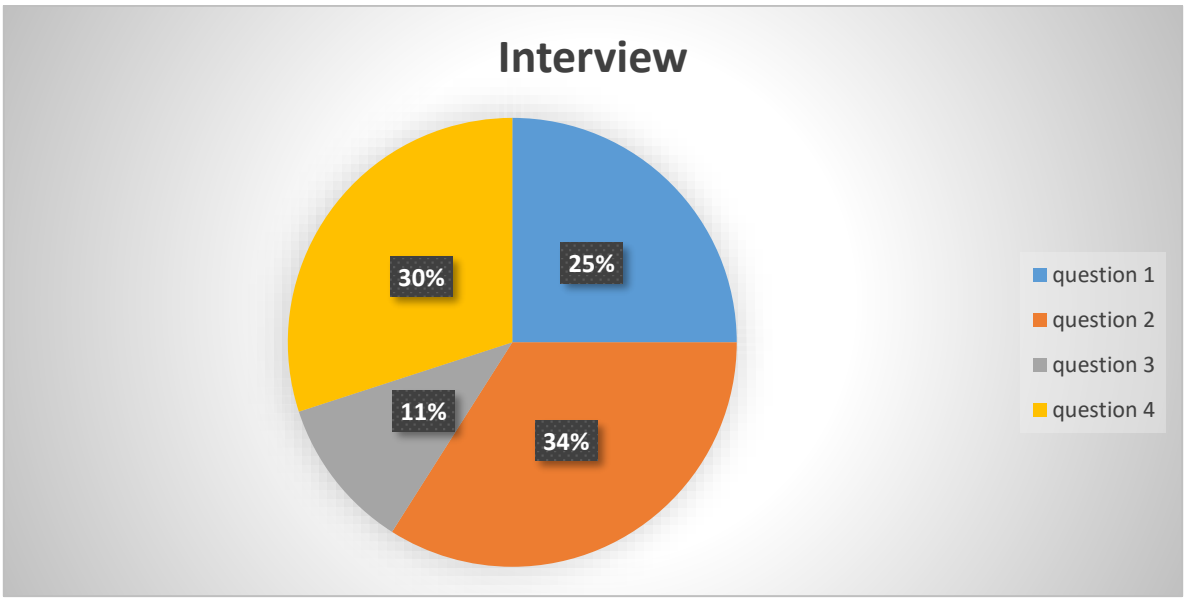
However, Widodo (2015) stated that acquisition of sufficient vocabulary is one of the major goals in learning English as an additional language. Nunan, (1991), Schmitt (2000), Wilkins (1972) indicated that vocabulary plays an important role in second or foreign language learning because it covers all the words students must know to access their background knowledge, express their ideas and communicate effectively, and learn about new concepts. In addition, Widodo (2016, p. 121) pointed out that "vocabulary plays a crucial role in language fluency development and knowledge building." He added that there are three crucial components of students' success in EFL learning: productivity, meaning making, and word quantity. In a content-based EFL instruction context, students should be provided with a range of general academic and content-based words, which in turn assist them in developing language proficiency. Furthermore, some scholars such as Folse (2010), Nagi (1998) made a statement that vocabulary is essential for the success of language learners' comprehension. This implies that acquiring proficient vocabulary contributes to learners' acquisition and creation of knowledge.

The acquisition of both academic vocabulary and technical or disciplinary English vocabulary is gradual in nature. With this in mind, words are not learned instantly, but they are learned over a period of time. Exposure to particular words influences the number of words learned. McCarthy (1990) points out that "no matter how well the students learn grammar, no matter how successfully the sounds of L2 are mastered, without words to express a wider range of meanings, communication in an L2 just cannot happen in any meaningful way." In other words, students' word knowledge is connected to academic success as students who have rich vocabularies can comprehend new ideas and concepts more quickly than students with limited vocabularies. This argument leads to the goal of the study; that is, to help students develop their specialized vocabulary and engage with meaning making through VSS and video viewing.

Zimmerman (1997) stated that vocabulary is central to language and of critical importance to the typical language learner. According to the statement of Zhang (2008), using appropriate presentation methods enables learners to obtain a deeper impression of and richer information about the target words to make them enter the long-term memory more easily.

Research Methods

In conducting research, we may use a wide range of instruments in order to find out the issues concerning the needs of learners' learning English through Electronic database. there are four possible options to apply for the issue such as learning English especially, via documentaries, via media supplies, via specific targeted videos, and appropriate listening materials. The interview was the main aim of the research to accomplish. Twenty engineering students were invited to respond for questions focused on the topic we set the goals to reach.



Pic.1.

Data Analysis

The options for learning English via documentaries, via media supplies, via specific targeted videos, and appropriate listening materials were highly stated and the result of the interview was indicated in the above-mentioned diagram. As we can see that willing to get to know the specialty in English by documentaries stated 25%, via media was

demonstrated 34%, via specific target videos showed 30%, but via listening audio materials indicated 11%. As a result, learners prefer learning English, technical one via media supplies and via targeted videos more comparing to others.

Conclusion

In learning technical English through electronic databases is not easy task to accomplish or fulfill the intentions of learners. However, adult engineering students have to pursue education in order to master high result in science.

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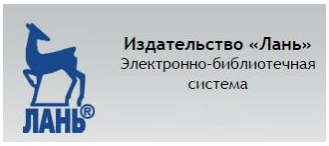

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Signed in print: 30.04.2022. Size 60x84 1/8

«Theoretical & Applied Science» (USA, Sweden, KZ)
Scientific publication, p.sh. 48.25. Edition of 90 copies.
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Printed «Theoretical & Applied Science»