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# BIOLOGICAL SCIENCES

## METHODS OF THE REMOTE EFFECT OF ETHANOL ON THE BEHAVIORAL REACTIONS OF THE OFFSPRING OF FEMALE RATS

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## МЕТОДЫ ОТДАЛЕННОГО ВЛИЯНИЯ ЭТАНОЛА НА ПОВЕДЕНЧЕСКИЕ РЕАКЦИИ ПОТОМСТВА САМОК КРЫС

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### Abstract

The present article is devoted to finding out what negative effect the ethanol solution can have as a source of fluid in pregnant females for prenatal development of the fetus, as well as its effect on the behavioral responses of their progeny. In the article one task is put: to analyze dynamics and to reveal features of behavioral reactions on open field models in 30-day-old rats. In the article the results of the analyses of behavioral reactions (on the open field model) of the offspring of female rats received in the second (prefetal period) stages of pregnancy of a 12% ethanol solution instead of the usual drinking water.

### Аннотация

Представленная статья посвящена на то, чтобы выяснить, какое отрицательное влияние может оказать раствор этанола использованное в качестве источника жидкости у беременных самок крыс на пренатальное развитие плода, а так же влияние его на поведенческие реакции их потомств. В статье ставятся одна задача: анализировать динамику и выявить особенности поведенческих реакции на модели открытого поля у 30-дневных крысят. В статье представлены результаты анализа поведенческих реакции (на модели «открытое поле») потомства самок крыс получившие во второй (предплодный период) стадии беременности 12%-й раствора этанола взамен обычной питьевой воды.

**Keywords:** ontogeny, prefetal period, ethanol, fetus, behavioral

**Ключевые слова:** онтогенез, предплодный период, этанол, плод, поведения

### Введение

Известно, что алкогольная интоксикация зависит от стадии эмбрионального развития и максимальная чувствительность к нему у эмбриона человека приходится на период интенсивной клеточно-тканевой дифференциации и органогенеза. Существуют данные подтверждающие о том, что при повреждении большого числа бластомеров зародыш гибнет, при повреждении относительно небольшого количества бластомеров дальнейшее развитие не нарушается (Попова Э.Н. 1988). По окончании этого периода неблагоприятные воздействия обычно приводят не к порокам развития, а к недоразвитию или функциональной незрелости органов плода (Кирющенко А.П. 1987, Бардиша Л. Р., Сатановская В. И. 1999, Пермяков, А.В. Витер В.И. 2002).

По мнению известного врача И. Блох только очень немного (от 7 до 17 процентов) потомков алкоголиков являются физически и психически нормальными, большинство же проявляет быстро прогрессирующее вырождение, выражающееся главным образом в физическом предрасположении к туберкулезу и эпилепсии, а психически в предрас-

положении к пьянству, преступлениям и слабости (Генкина О.Н., Курелла Б. 1989, Adams N., Oldham T.D., et al., 2001).

Клиническими и экспериментальными исследованиями установлен, что этанол сравнительно быстро проникает как через плаценту, так и через гематоэнцефалический барьер плода, поскольку обладает высокой растворимостью в липидах, а оба эти барьера липидные. Вследствие этого концентрация этанола в крови и спинномозговой жидкости плода сравнительно быстро повышается и становится такой же, как в крови беременной. Амниотическая жидкость также содержит этанол, создавая тем самым дополнительный источник поступления его в организм плода.

Как известно риск внутриутробного поражения плода при алкоголизме матери прямо зависит от количества и регулярность приема спиртных напитков. В периоде развития плода выделяются так называемые критические периоды, в течение которых плод особенно чувствителен к воздействию различных вредных факторов. В наших исследованиях был выбран 2-ая неделя беременности

(предплодные периоды) самок крыс, когда закладываются и формируются все основные органы и системы эмбриона.

Характер и скорость этих процессов определяются и регулируются функциональной системой мать-плацента – плод. Поскольку в начале этого периода продолжается формирование органов и систем плода, то воздействие вредных факторов в этот период может вызвать порок в тех органах, где органогенез еще не закончился. При хроническом алкоголизме, алкоголь и его метаболиты, вредно воздействуя на формирование центральной нервной системы и особенно на ее регуляторные механизмы часто приводят к глубоким недугам приспособительных реакций развивающегося организма.

Как известно, употребление алкоголя во время беременности, приводящее к эмбрио-фетогенезу, проявляется и на протяжении постнатального развития потомства (Hansen L. F., Rehfeld J. F. 2000, Devaud L.L., Chadda R., 2001).

Поэтому вызывает интерес рассмотрение постнатальных онтогенетических изменений поведенческих реакций алкоголизованных особей в период эмбриогенеза.

#### **Методы исследования**

Объектом исследования были белые крысы-самцы породы Вистар. Все работы с животными проводились согласно этическим требованиям Европейской конвенции защиты прав лабораторных животных. Формировали 2 группы животных: первая группа явилась контрольной, вторая группа – экспериментальной. Подопытные животные ежедневно получали в качестве источника жидкости 12% раствор этанола. Контролем служили животные, получавшие для питья чистую воду. Исследование проводили в 30-е сутки жизни животных.

Проводили наблюдательные исследования: регистрировали динамики поведенческих реакций животных на специально сооруженном для этих исследований оборудовании – «открытое поле». Были зафиксированы время выхода, длительность пребывания в центральном квадрате, пересечения центрального квадрата, горизонтальная стойка, частота груминга и акта дефекаций. Регистрации указанных событий производили в течение 3-5 минут.

Всего в работе было использовано 65 голов 30-тидневных крысят (30 голов контрольные и 35 экспериментальные), полученные от 15-ти самок крыс (5 контрольные, 10 экспериментальные).

#### **Результаты исследования и их обсуждения**

Несмотря на разностороннее активное изучение проблем алкоголизма, механизмы многих нарушений, возникающих при этом, остаются мало изученным. Одним из основных направлений является исследование поведенческих нарушений, возникающих у потомства алкоголиков. В настоящее время не вызывает сомнений, что хроническое потребление алкоголя матерью во время беременности пагубно отражается на всех системах организма, в том числе и на поведенческо-приспособительные реакции.

Исследование экспериментальных животных в тесте «открытое поле» позволяет оценить динамику их приспособительных реакций и быстрое решение выхода из дискомфорта, обусловленные внешними раздражителями. Как известно при таких исследованиях чаще всего используются яркое освещение центральных квадратов «поле», в котором размещен экспериментальный объект. Исследование контрольных (пренатально развившихся в нормальных условиях содержания матерей) показали, что в первой минуте тестирования в «открытое поле» крысы вели себя активно и пересекали в среднем 16 квадратов.

Употребление беременными животными этанола, видимо способствует нарушению процесса формирования структурно-функциональных основ механизмов, ответственные за регуляцию психо-эмоционального статуса развивающегося организма. Об этом утверждает и тот факт, что количество груминговых реакций внутри экспериментальной группы исследования достоверно повышалось. Что по некоторым литературным данным (Генгин М.Т., 2002) указывает на тот факт, что данная поведенческая реакция является реакцией замещения двигательных актов и свидетельствует о проявлении тревожности.

Кроме того, у животных, подвергавшихся воздействию этанола, отмечено изменения количество дефекаций. Эти данные свидетельствует о высоком уровне тревоги. Так же в поведении у экспериментальных животных наблюдались частые замирания, которые вероятно свидетельствуют о проявлении тревожности. Вероятно, такие изменения поведенческих реакций животных связаны с воздействием этанола на все нейро-регуляторные системы мозга.

По литературным данным установлено, что введение этанола приводит к активации ГАМК-ергических структур мозга. Вероятно, преобладание тормозных процессов в нервной системе по мнению авторов и объясняет снижение двигательной активности и общего уровня активного бодрствования (Вернигора А.Н., Генгин М.Т. 1993, Генгин М.Т. 2002).

Таким образом, хроническое употребление этанола беременными животными приводит к значительным изменениям поведения их потомств. Полученные нами данные в этом аспекте позволяют прийти к следующему заключению о том, что предплодные периоды беременности самок крыс являются чувствительными к воздействию алкоголя по отношению статуса поведенческих реакций их потомства в силу того, что именно в эти периоды пренатального онтогенеза происходит формирование важнейших органов и систем.

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#### THE EFFECT OF HERBAL PREPARATIONS ON CHANGES IN THE RESISTANCE OF ERYTHROCYTE MEMBRANES

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#### ВЛИЯНИЕ РАСТИТЕЛЬНОГО ПРЕПАРАТА НА ИЗМЕНЕНИЯ РЕЗИСТЕНТНОСТИ ЭРИТРОЦИТАРНЫХ МЕМБРАН

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#### Abstract

The effect of phytopreparation on the change in the resistance of rat erythrocyte membranes in different age periods was studied. It has been shown that the use of a herbal preparation increases the resistance of erythrocytes to peroxide hemolysis, reduces membrane permeability and stabilizes cell membranes.

#### Аннотация

Исследовали влияние фитопрепарата на изменение резистентности мембран эритроцитов крыс в разные возрастные периоды. Показано, что применение растительного препарата повышает устойчивость эритроцитов к перекисному гемолизу, снижает проницаемость мембран и стабилизирует мембраны клеток.

**Keywords:** erythrocytes 1, hemolysis 2, membrane 3, antioxidant 4, phytopreparation 5, free radicals 6, resistance 7.

**Ключевые слова:** эритроциты 1, гемолиз 2, мембрана 3, антиоксидант 4, фитопрепарат 5, свободные радикалы 6, резистентность 7.

Биологическое старение связано с увеличением клеточного уровня активных форм кислорода, а также образованием и накоплением окисленных биологических молекул [1]. Свободным радикалам кислорода и свободнорадикальным окислительным реакциям отводят существенную роль в повреждении белков и липидов, образовании богатых продуктами перекисного окисления липидов "пигмен-

тов старения" в патологии старения различных органов [2,3]. Свободные радикалы кислорода рассматриваются как важные факторы, включающиеся в феномен биологического старения. Они могут повредить внутриклеточные компоненты такие, как ДНК, белки, и мембранные липиды которые могут привести к мутагенезу, ингибированию роста и клеточной смерти, и далее вовлечены в старение [4].



Для сохранения здоровья населения в разные возрастные периоды немаловажное значение имеет повышение резистентности организма с помощью природных биологически активных соединений. К эффективным геропротекторам можно отнести препараты, снижающие риск развития хронических заболеваний, повышающие продолжительность жизни, замедляющих процессы старения [5]. Известно, что при распространенных терапевтических заболеваниях процессы старения связаны с нарушением баланса показателей про- и антиоксидантной системы организма [6]. Мембраны эритроцитов являются одной из важных составляющих живой клетки, обеспечивающей нормальное функционирование остальных ее компонентов и при исследовании биологических мембран часто используют эритроциты как модель, отражающую состояние мембран всего организма [7,8]. В настоящее время обращает на себя внимание факт недостаточного использования профилактических и оздоровительных свойств растительных лекарственных средств. В этом направлении проведены исследования препаратов, выделенных из растений, обладающих антиоксидантными, мембранопротекторными свойствами, которые и могут быть средством для улучшения долголетия населения.

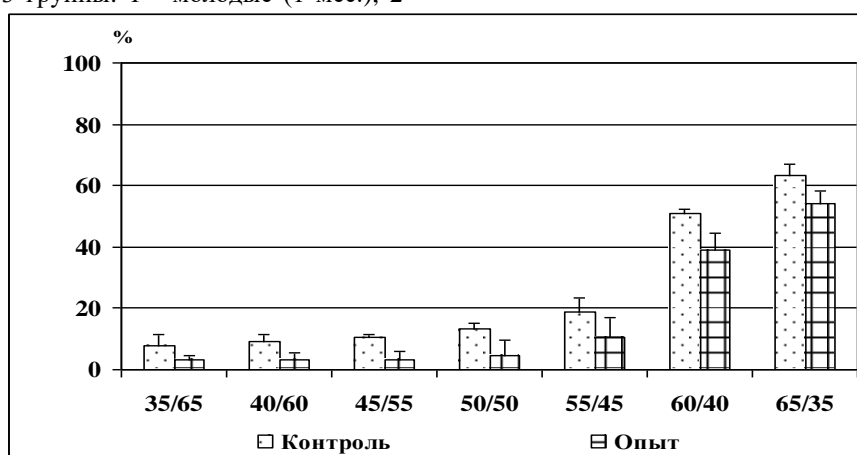
Цель работы: изучение влияния фитопрепарата на изменение резистентности мембран эритроцитов крыс разного возрастного периода.

Материалы и методы. Животные были разделены на 3 группы: 1 - молодые (1 мес.), 2 -

взрослые (6 мес.) и 3 - старые (24 мес.). Эксперименты проведены в условиях *in vivo* месячных, шести месячных и 24-месячного возраста. Эритроциты получали, центрифугируя кровь 10 мин при 1000g. Плазму и клетки белой крови удаляли, а эритроциты дважды промывали средой, содержащей 150 мМ NaCl, 5 мМ Na<sub>2</sub>HPO<sub>4</sub> (pH-7,4). Перекисную резистентность эритроцитов определяли по методу [9]. Проницаемость эритроцитарных мембран определяли по методу [10]. Результаты статистически обрабатывали с использованием программы Microsoft Excel и GraphPad Prism 5,01. С учетом критерия Фишера-Стьюдента зарегистрированные изменения показателей считали достоверными при  $p \leq 0,05$ .

Результаты. Исследованы возрастные изменения резистентности мембран эритроцитов крыс разного возраста при применении фитопрепарата по выявлению мембранопротекторного воздействия.

Благодаря способности избирательной проницаемости мембраны к различным веществам сохраняется постоянство внутренней и внешней среды клетки. Изменения проницаемости влекут за собой нарушения в жизнедеятельности клеток и как конечный результат повреждение ткани и органа в целом. Данные экспериментов исследования проницаемости эритроцитарных мембран животных получавших фитопрепарат представлены на рисунках 1-3.

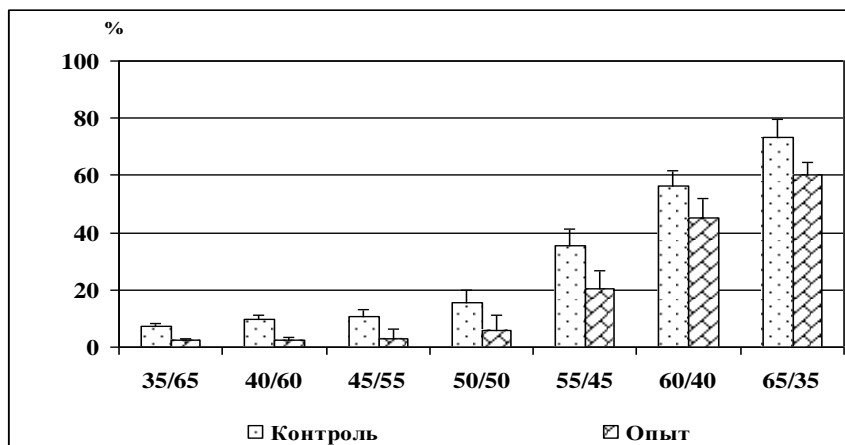


По оси абсцисс: концентрации растворов мочевины/NaCl; по оси ординат: величина гемолиза, % ( $p \leq 0,001$ ).

Рис.1. Исследование проницаемости эритроцитарных мембран при приеме фитопрепарата у крыс молодого возраста

Из рисунков видно, что при увеличении соотношения мочевины в растворе хлорида натрия увеличивается степень гемолиза эритроцитов во всех исследованных группах. Как приведено на рисунке 1, у месячных крыс контрольной группы уровень гемолиза составляет 63% при соотношении

растворов мочевины/ NaCl равному 65/35, 51% при 60/40, 19% при 55/45, 13% при 50/50, 10%, 9% и 8% при соотношениях 45/55, 40/60, 35/65.

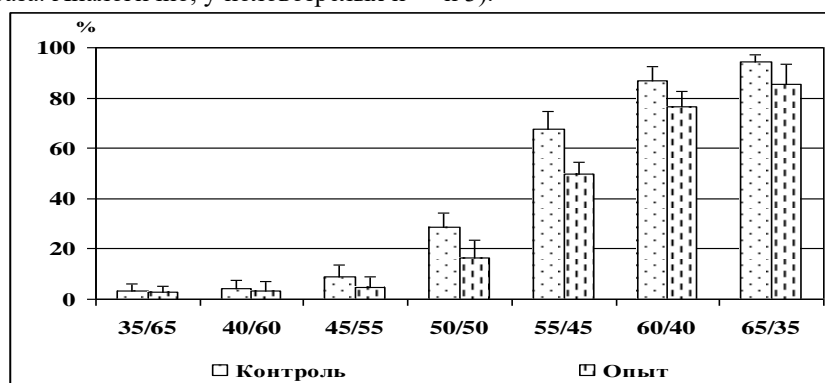


По оси абсцисс: концентрации растворов мочевины/NaCl; по оси ординат: величина гемолиза, % ( $p \leq 0,001$ ).

Рис.2. Исследование проницаемости эритроцитарных мембран при приеме фитопрепарата у крыс половозрелого возраста

При анализе показателей уровня гемолиза эритроцитов опытной группы выявлено, что степень гемолитического повреждения клеток, вследствие нарушения проницаемости мембраны снизилась в 1,3-3,3 раза. Аналогично, у половозрелых и

старых крыс, получавших фитопрепарат степень гемолиза ниже практически на 70% при соотношениях 35/65- 50/50, на 43% при 55/45, на 20% при 60/40 и 65/35 по сравнению с контролем (рисунок 2 и 3).



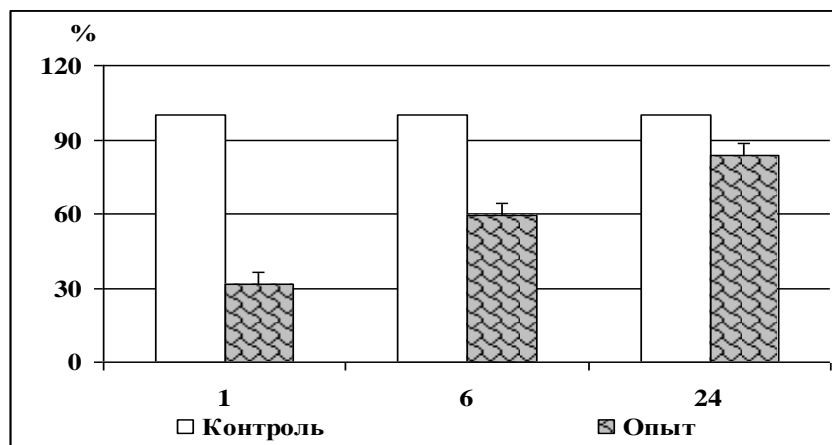
По оси абсцисс: концентрации растворов мочевины/NaCl; по оси ординат: величина гемолиза, % ( $p \leq 0,001$ ).

Рис.3. Исследование проницаемости эритроцитарных мембран при приеме фитопрепарата у старых крыс

Известно, что перекись водорода – слабый окислитель, она относительно стабильна и может мигрировать в клетке и ткани. Однако,  $H_2O_2$  содержит в своей молекуле кислород и при наличии в среде металлов переменной валентности может

стать источником агрессивных форм кислорода, которые приводят к повреждению биомолекул клетки.

Следующая часть исследований посвящена оценке резистентности эритроцитов перекисному гемолизу в процессе старения (рисунок 4).



По оси абсцисс: возрастные группы животных: 1,6,24 - месяца; по оси ординат: величина гемолиза, % ( $p \leq 0,001$ ).

Рис.4. Исследование влияния фитопрепарата на перекисный гемолиз эритроцитов

Как видно из рисунка, у животных получавших фитопрепарат в течение двух недель отмечается повышение устойчивости мембран эритроцитов внешнему воздействию перекиси водорода. Уровень гемолиза у молодых крыс достоверно снизился до 70%, у половозрелых крыс на 40% и у старых на 17% по сравнению с контролем.

Выводы. Таким образом, можно предположить, что в основе мембраностабилизирующего эффекта фитопрепарата лежит его способность снижать уровень образования продуктов окислительного стресса. Применение растительного препарата повышает устойчивость эритроцитов к гемолизу, снижает проницаемость мембран, стабилизирует эритроцитарные мембраны клеток организма во всех возрастных группах животных.

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# CULTURAL SCIENCES

## SHUSHA-THE PEARL OF THE CAUCASUS

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*"This is our ancient and historical city. For centuries, Azerbaijanis have lived, built, and created in Shusha. Shusha is a pearl not only of Azerbaijan but also of the entire Caucasus."*  
İlham ALIYEV

### Abstract

The current article portrays Shusha, the Pearl of Azerbaijan, the cradle of Music, Conservatory, and its indispensable role in developing our culture, historical figures, music, and art. The article states the personalities who grew up in this mysterious city and how they affected both Azerbaijani and world cultures.

**Keywords:** Shusha, education, culture, music, art, personalities, Conservatory

### Introduction

It is impressive that our homeland Azerbaijan is among the charming corners of the world. Along with its history and nature, Azerbaijan has always attracted the world's attention with its culture, music, literature, and art. Today, there are great personalities in the fields of medicine, economics, technology, agriculture, sports, science, education, and culture.

Karabakh is the charming corner of our homeland. As the "heart of Karabakh," Shusha is a cultural, scientific, and literary source center that all of us pride. The Voice of Khan Shushinski, Bulbul, and Jabbar Garyagdioglu is a source of inspiration for Natavan, Vagif, and Uzeyir. Shusha is a fortress magnificent for every Azerbaijani. Shusha is also one of the valuable cultural centers of the South Caucasus and stands out for its national architectural style. Shusha is famous for its historical personalities, material and cultural heritage, monuments, history, and a valuable monument of medieval urban art, which it gave to our culture, literature, and art. The charming corner of Karabakh, which is considered the cradle of our mugham, the city of Shusha, is forever the cultural Temple of Azerbaijan.

Our cultural center Shusha was founded in 1750 by prominent political and statesman Panahali Khan Javanshir. In 1756-1757 Shusha fortress was built as a bright example of our culture on a mountain surrounded by cliffs. For a certain period, the city was named "Panahabad" in honor of Panahali Khan, and later "Shusha fortress" and "Shusha." Shusha occupies a special place in the history of Azerbaijan not only with cultural and historical monuments but also with prominent figures of Science, Education, and art. This land, this

mysterious city, has a special place in history with outstanding personalities like Gasim Bey Zakir, Khurshidbanu Natavan, Mir Mohsun Navvab, Najaf Bey Vezirov, Abdurrahim Bey Hagverdiyev, Firidun Bey Kocharli, Ahmad Bey Agaoglu, Yusif Vazir Chamanzaminli, and others. Shusha is known in the world as the cradle of mugham. It is from this Saba that Shusha is called "the conservatory of the South Caucasus." and "the temple of Azerbaijan music."

British travelers and scientists C. Morye and R. Burter were impressed with the beauty and nature of Shusha and expressed valuable views on its antiquity and history. According to Morye, Shusha was a human settlement even before the era. R. Burter writes that "there are stone buildings, wide streets with stone floors, as in European cities not elsewhere in the Caucasus in Shusha, and the remains of beautiful baths reminiscent of ancient Roman Baths."

On 1992 May 8, during the 29 years of occupation of the ancient music and cultural center of Azerbaijan-Shusha city by the Armenian army, 25 schools, 31 libraries, 20 health institutions, 17 clubs, 8 Culture houses, 4 technical schools, and 2 institutes branches, 7 kindergartens, 4 cinemas, 5 cultural centers and Parks, 2 sanatoriums, 2 hotels, filial of Azerbaijan Carpet State Museum, of the tribe of Issachar. Houses inhabited by Suleyman Sani Akhundov, Najaf Bey Vezirov, Yusif Vazir Chamanzaminli, Khan Shushinsky, Sadigjan, Jabbar Garyagdioglu, State painting gallery, house museums of Uzeyir Bey Hajibeyli, Bulbul, Springs, Historical Sites, caravanserais and many monuments were destroyed.

It should be noted that several cities in the world are distinguished by high and devoted attitudes to culture, science, education, art, and music permeated with every stone, castle, and atmosphere. These are Vienna of Austria, Naples of Italy, and Shusha of Azerbaijan. The city of Shusha, called "Conservatory of the East," which is famous for Pastures Turshsu, at an altitude of 1403 meters above sea level, has become the most resting place for guests as a resort, as if it were a work of art painted by some artist with great love, made by the architect with special taste, Jabbar Garyagdi Oglu, Gurban Pirimov, Islam, the Quran, the Hadith (Sahih al-Bukhari, Sahih Muslim, and Sahih al-Bukhari). Several other art figures, such as Sara Gadimova, were also from her homeland. The melancholy of Jabbar, Khan, Bulbul, the sound of the victim's tar, the burning and soul-touching music of Uzeyir Bey's leyli and Majnun opera, The Spirit of Koroglu's overture, the blood-blowing sound, the plotline of "Arshin mal alan," "O olmasin, bu olsun" musical comedies that make you smile and at the same time make you think was inspired by Shusha soil, water, air, and steep rocks.

For this reason, the soul of every Azerbaijani sings, coarsens, and makes you laugh. The power of the nature and water of this city is that the works of great Uzeyir Bey are met with great applause in almost all countries of the world and cause great interest and discussion. His musical comedy "Arshin mal alan" gained wide popularity. Work in English, German, Chinese, Arabic, Persian, Polish, Ukrainian, Belarusian, Georgian, etc. (About 70) translated into languages, Moscow, Istanbul, New York, Paris, London, Tehran, Cairo, Beijing, Berlin, Warsaw, Sofia, Budapest, Bucharest, etc. it was staged on the stage of 120 theatres and was repeatedly screened. Another famous operetta by hajibeyov "O olmasin, bu olsun" was screened in Yalta in 1919 and for the second time in 1956 in the film studio Azerbaijan film.

## Conclusion

The personalities of Shusha have contributed to the development of Azerbaijani art, culture, and world culture. That is why Shusha left its mark in history as an irreplaceable city and an impregnable fortress of Azerbaijan. Shusha has become the Pearl of the Caucasus with its beauty and rich culture. Our Shusha was occupied on May 8, 1992, and was liberated on November 8, 2020, by **the Armed Forces of Azerbaijan**. The Order of the President of the Republic of Azerbaijan Ilham Aliyev, January 5, 2022, was declared the "Year of Shusha" in the Republic of Azerbaijan. Currently, the president of the Republic of Azerbaijan, Ilham Aliyev, is restoring the cultural monuments destroyed by Armenians, our national and spiritual wealth, and the infrastructure for the return of the population to their native lands. We return home with the motto "Shusha, you are free" (Mr. Ilham Aliyev).

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# EARTH SCIENCES

## TO THE STUDY OF THE BIOGEOCENOTIC STATE OF THE GRAY-BROWN (CHESTNUT) SOILS OF THE GARABAGH STEPPE DURING IN THE POST-WAR TIME

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### Abstract

The article provides biocenotic data on gray-brown (chestnut) soils of the Garabakh steppe (KNEB, Su-Govushan) before the outbreak of hostilities. Given that soil pedobionts are the most sensitive to pollution, soil-forming agents, the article shows the abundance, biomass of the main groups in virgin and developed (vineyard, grain, cotton, alfalfa) cenoses, as well as the energy of food consumed by lumbricides. Analyzing the available data, as well as literary sources, it became necessary to study soil-biological indicators and characteristic changes in the studied biotopes in the post-war period. The complex of necessary restoration and reclamation works is also indicated.

**Keywords:** soil, pollution, biota, recultivation

### Introduction

In modern soil science, in particular for soil diagnostics, biological methods are increasingly used. Plants, invertebrates, microorganisms of various systematic groups react quite quickly to changing conditions and can serve as indicators of soil properties and the processes occurring in it.

For diagnostic purposes, soil pedobionts, as well as their metabolic products, have certain advantages over data on soil morphology, chemistry, and mineralogy, since the latter characterize mainly conservative features and properties of soils.

Communities of living organisms (pedobionts) inherent in different soils reflect mainly the dynamic properties of the soil. Therefore, the data of biological studies represent objective indicators (indicators) of the current regime of soil life.

The use of complexes of soil invertebrates, microorganisms, and products of their vital activity that inhabit the soil, differing in their ecological and biological diagnostics of soil types, clarification of their genesis, as well as for assessing the soil in order to increase its fertility and crop yields.

Soil biodiagnostics is currently gaining relevance, since it is closely related to the issues of increasing soil fertility and productivity of agricultural plants, protecting the environment from destruction and various forms of pollution.

### Research methodology

The studies were carried out on the example of gray-brown (chestnut) soils of the Garabagh steppe. As objects of study, virgin biotopes under natural vegetation (wormwood-ephemeral community) and irrigated

agrocenoses (vineyard, cereals, cotton, alfalfa) were chosen.

These biocenoses were located on the territory of the Karabakh Scientific and Experimental Base (KNEB), not far from the Su-Govushan residential area, which for a long time (about 30 years) was subjected to military aggression.

Considering that biological agents (plants, pedobionts, microorganisms) of soil formation most sensitively react to any form of anthropogenic impact (including military ones), we tried to approach this issue in a comprehensive manner from monitoring positions. First, the plant formation was refined, and then the soil biota and their trophic structure were taken into account [2,1].

### Results and discussions

Initially, complexes of soil invertebrates and their quantitative indicators were studied (table 1). Virgin cenoses (under natural vegetation) are inhabited mainly by xerophilic groups among which insects (Insecta) dominate, with a complete absence of Lumbricidae (Lumbricidae), diplopods (Diplopoda) and representatives of other mesophilic groups.

The average number of invertebrates in the virgin area was 10.7 ind./m<sup>2</sup> with a biomass of 1346 mg/m<sup>2</sup>. On agrocenoses, xerophilous species disappear, and the number and biomass of moisture-loving groups increase. The largest number of 50.7 ind./m<sup>2</sup> and biomass of 10458 mg/m<sup>2</sup> were recorded on long-term irrigated soils under the vineyard.

The number and biomass of invertebrates on long-term irrigated soils under cereals and cotton, respectively, are 27 ind./m<sup>2</sup>, 6050 mg/m<sup>2</sup> and 7.3 ind./m<sup>2</sup> 1082 mg/m<sup>2</sup> [1].

**Table 1**

Abundance and biomass of invertebrates in individual cenoses  
of gray-brown (chestnut) soils

Biocenoses	Abundance, ind./m <sup>2</sup>	Biomass, mg/m <sup>2</sup>
Virgin (wormwood-ephemeral community)	11,0	1346
Agrocenoses: vineyard	50,7	10458
Irrigated cereals	27	6050
Cotton plant	7,3	1082

Graphic relationships in soil invertebrate communities of the studied soils of the virgin cenosis are distinguished by a large number of phytophages - 66.4%, saprophages and predators account for 3.7% and 29.9%. On irrigated soils, saprophages predominate, making up 82.6%, 93.6% and 94.7% for individual cenoses.

As is known, the mass of processed plant material is a measure of the activity of soil saprophages and determines their relative importance in the energy flow through the ecosystem. Studies have established that in individual cenoses of gray-brown (chestnut) soils, the energy of food consumed by the activity of Lumbricidae differs significantly from each other [4] (table 2).

**Table 2**

Energy (kcal/m<sup>2</sup>) of food consumed by earthworms for individual cenoses  
of gray-brown (chestnut) soils

Invertebrates	Virgin soil	Agrocenoses	
	Wormwood-ephemeral community	Alfalfa	Vineyard
Lumbricides	1,16	229,50	24,05

The soil cover is one of the most powerful regulators of the chemical composition of the atmosphere and hydrosphere. Preservation and improvement of the soil cover in conditions of intensification of agricultural production, development of industry, transport is possible only with well-established control over the use of all types of soil and land resources.

Environmental pollution has become the most serious environmental and economic problem of the country. Natural landscapes and, in general, living matter are significantly affected by anthropogenic and technogenic pressure, under the influence of escalating global ecological and regional processes, which include military operations [3].

Considering that the studied gray-brown (chestnut) soils (Su-Govushan) are located near military operations, it is natural that natural landscapes and agrocenoses experience the most severe technogenic (military) pollution. Wastes of various chemical compositions (including phosphorus) from exploding shells, mines and other military resources enter the soil, which ultimately change not only the general state of landscapes, but also disrupt the evolutionarily established coenotic connections between all components of the biogeocenosis.

One can only imagine what changes may occur in such extreme cases:

1) the current physical and geographical state of natural landscapes is being disrupted;

2) the natural vegetation cover is degraded, the dominant plant species are reduced, their phytomass is reduced;

3) degrade complexes of soil pedobionts involved in the processes of decomposition and humification of organic residues;

4) the activity of biological (biochemical, microbiological, zoological) processes is disturbed;

5) the structure and characteristics of morphogenetic profiles of natural and cultivated soils change;

6) the physical and chemical parameters of gray-brown (chestnut) soils change quantitatively and qualitatively, erosion processes differ;

7) the ratio of individual trophic (according to food specialization) groups of soil organisms is significantly disturbed;

8) the soil accumulates chemical components, different in their toxic, carcinogenic properties, heavy metals;

9) substances that persist in nature for a long time, capable of causing diseases and thereby changing the epidemiological state of the environment, can be involved in the biological cycle (at a food price);

10) the transformation of solar energy in separate blocks of natural and cultivated cenoses is disrupted.

Therefore, first of all, it is necessary to carry out detailed monitoring studies of soils subjected to anthropogenic-technical (military) impact. At the same time, efforts should be concentrated on studying the main patterns of evolution of natural landscapes with a view to their rational use.

Ecological zoning is one of the necessary ways to achieve this goal [3].

Based on the foregoing, it is necessary to dwell on some expediently carried out restoration and reclamation work:

1) *organizational and economic activities* - provides for the justification and preparation of an action plan, and ensuring its implementation;

2) *agrotechnical measures* - include phytomeliorative methods, anti-erosion treatment, the use of organic and mineral fertilizers, regulation of livestock grazing;

3) *forest reclamation activities* - includes the creation of forest protective plantations;

4) *hydrotechnical measures* - includes the creation of hydraulic structures for regulating water resources;

5) *soil mapping*.

Thus, the zoning of the soils of Azerbaijan in terms of resistance to pollution by various technogenic wastes is possible only on deep scientifically based studies.

### Conclusion

1. Some biocenotic data on gray-brown (chestnut) soils before the outbreak of hostilities are given.

2. The necessity of monitoring these soils in the post-war period and the expediency of carrying out restoration and reclamation work are noted.

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# ECONOMIC SCIENCES

## CURRENT ISSUES OF AUDIT QUALITY IN THE BANKING SYSTEM OF GEORGIA

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### Abstract

To ensure the stability of the Georgian banking system, it is important to define supervisory strategies in accordance with international best practice and to develop recommendations for the introduction of International Financial Reporting Standards. Effective external auditing by commercial banks is possible through the introduction of external audit mechanisms and an effective communication framework developed within EU practice, which will help audit firms to plan their activities properly and draw conclusions within international auditing standards.

The measures defined by the audit regulatory documents developed by the National Bank of Georgia are evaluated, the introduction of which will increase the quality of the audit, improve the control system and it increase the reliability of the audit services as well.

Conclusions have been drawn on improving the quality management system of the audit and its regulation, financial transparency, oversight policies, and fulfilling EU obligations.

**Keywords:** audit of banking system, effective communication, audit quality.

The Georgian banking system has endured the shock of the COVID-19 pandemic and its resilience has been increased. The effort to increase the resilience of the financial system is a continuous process and it is achieved through a combination of macroprudential measures focused on the banking system and individual financial institutions. [1] There is uncertainty about the further development and consequently economic forecasts of the banking system.

A temporary supervisory plan has been developed by the National Bank of Georgia, which allows the use of capital and liquidity buffers under the financial stress of the banking sector and it actively continues to work to promote the sustainability and financial stability of the financial system. According to the supervisory strategy of the National Bank of Georgia for 2020-2022, [2] approximation to international accounting and auditing standards is one of the supervisory priorities set for 2020-2022. The National Bank has developed a guide switching financial reporting to international standards considering international practice [3] and a guide for effective communication between audit firms and the National Bank. [4]

In order to fully switch to IFRS, the National Bank of Georgia will have to prepare supervisory reports in accordance with IFRS standards, and calculate the supervisory indicators based on updated instructions. The National Bank has introduced the FINREP reporting form and additional reports used in EU practice to provide financial information to commercial banks. FINREP Supplemental Form is price based. The successful completion of the project of transition to IFRS in the banking sector of Georgia will be possible with the active involvement of internal and external audit specialists and local experts with international experience and by training of banking sector staff.

Communication issues between the National Bank and audit firms are regulated by the Law of the National Bank of Georgia [5], which sets out the requirements

for the National Bank to share information with audit firms, as well as to obtain information from the audit firm and to maintain and process confidential information. Communication with the supervisory authority is another helpful source for the audit firm in identifying, assessing, and responding to material risk.

External auditors have an important role to play in maintaining the reliability of financial statements as they determine whether IFRS complies with International Financial Reporting Standards. Internal audit deficiencies may be identified during the audit, which will be taken into account by the Supervisory Service in further activities.

The purpose of the guidelines for effective communication between audit firms and the National Bank developed by the National Bank of Georgia is to establish the fundamental principles by which communication and cooperation between the supervisory body and audit firms should be conducted. It provides a general communication framework, principles, and a standardized communication plan. To fulfill the above mentioned requirements, banks will have to take significant steps towards professional development of employees, such as the process of professional certification of internal audit, training, seminars, conferences, software updates, introduction of real-time audit components, development of data analysis process, optimization of remote internal audit.

In order to establish a modern culture of external audit in the Georgian banking system, it is necessary to develop external audit mechanisms for commercial banks on the basis of recommendation documents adopted by the Basel Committee on Banking Supervision, EBA of the European Banking Authority, and the World Bank. It is also important to learn from international practice and strengthen cooperation with foreign partners.

An external independent audit is one of the important monitoring mechanisms that alleviates the

problem of the firm and limits the opportunistic behavior of managers. [6] To reduce the expenses of the firm, the auditor should detect and report any financial reporting errors as precisely as possible. [7] The higher the qualification of the auditor, the higher the quality of the audit. As an important part of information disclosure systems, the quality of the audit directly affects the quality of the accounting information and in turn influences the decisions and actions of the accounting information user. Therefore, the study of the determinants of an audit quality has a great theoretical and practical importance. [8]

The European audit regulation states that effective communication must take place between the supervisory body of credit institutions on the one hand and the audit firms on the other hand that will carry out the statutory audit of credit institutions. The obligation to comply with this requirement applies to both parties that take part in the dialogue [9]

The most important component of the control of audit firms is the internal firm control of the quality of audit services, which helps to increase their reputation. When selecting audit firms by the supervisory body, priority should be given to those audit organizations that have an effective internal quality control system.

According to the guidelines for effective communication between audit firms and the National Bank, in order to improve communication between the supervisory body and audit firms, the following issues should be taken into consideration: financial stability, sustainability and security of the banking system; effectiveness of the banking supervision process, introduction of effective communication

practices, adaptive and flexible communication towards unexpected events, a correct vision of roles and responsibilities of each party, protection of confidentiality requirements.

In examining the key components of the IFRS transition in the Georgian banking sector, the external auditor should address the following issues in his / her audit report prepared in accordance with the International Financial Reporting Standards (IFRS) Guide: updated reserve policy, calculation of supervision rates, coefficient of Leverage, coefficient of interrelated and related parties, coefficient of liquidity hedging and open currency position, coefficient of net financing and IRRBB. In order to carry out an external audit effectively, a commercial bank should assist audit firms at the initial stage of audit planning and provide relevant regulatory information.

According to theoretical sources, accurate reflection of facts it is more important than all other principles, among them the principle of proper attention. An accounting unit is obliged to observe the rule of the accurate reflection of facts – the basis for business accounting. In connection with this, we think that auditor's report shall be added one more article in which there will be mentioned similar cases, their quantity and results. The addition of such article will allow the consumer to obtain real information about an actual accounting unit. For consumers it is important if financial statement is prepared according to the corresponding legislative base, but for making of decisions of economical character it is more important if financial statement reflects accurate facts. [11]

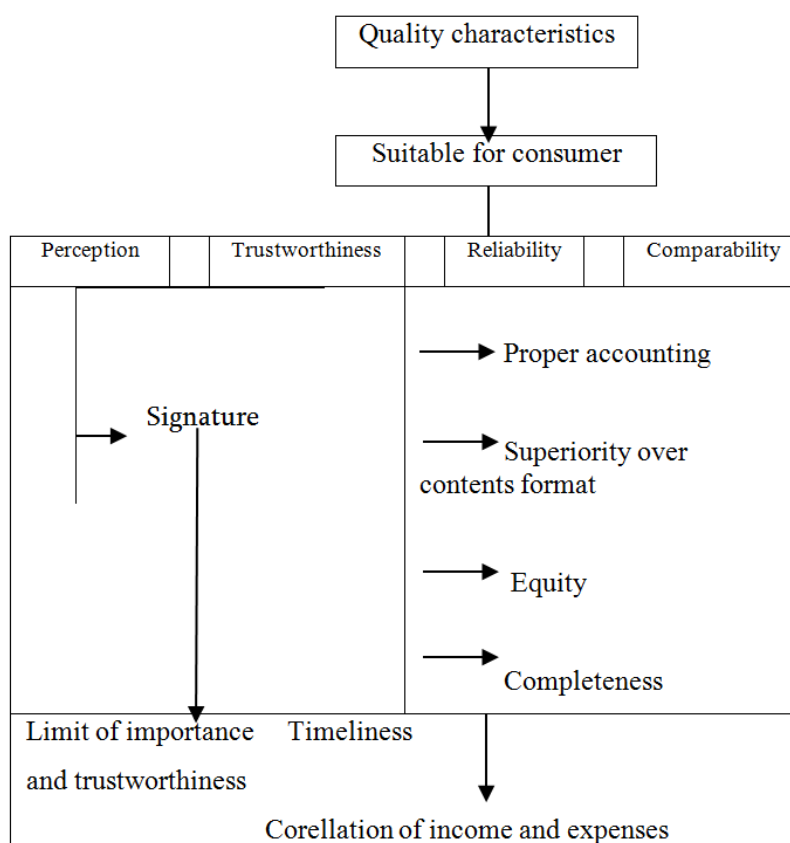


Fig. 1 Quality Characteristics

According to the requirements of the second article of Georgian law "On business accounting, reporting

and audit" companies are divided into following categories [11]:

#### TYPES OF COMPANIES, CRITERIA OF THEIR DEFINITION; REQUIREMENTS OF ACCOUNTING AND AUDIT

Company type	Assets (GEL)	Turnover (GEL)	Workers	Preparation of accounts	Publication	Obligatory audit
4 category (so called micro)	<1 000 000	<2 000 000	<10	By simple rule	No	No
3 category (so called small)	<10 000 000	<20 000 000	<50	IFRS for SME	Shortened	No
2 category (so called medium)	<50 000 000	<100 000 000	<250	IFRS for SME	Complete	Yes
1 category (so called large)	>50 000 000	>100 000 000	>250	IFRS	Complete	Yes

Requirement of accounting according to IFRS exists since 2000.

\* For 3-4 categories companies accounting requirements are simplified (by existed law they were requested IFRS for SME).

\*\*For 1-2 category companies there was added request of audit what will be met by majority (from applicable request of obligatory audit and business parameters).[11]

Audit firms should adhere to the following basic principles in accordance with international auditing standards. Shared information should be relevant to both parties, effective communication between the supervisory body and audit firms should be established through appropriate communication channels, and competent persons should be involved in the communication. The frequency of communication should depend on the timely sharing of relevant information.

In order for a commercial bank to conduct a quality audit of a commercial bank in accordance with the "Effective Communication Guide", the auditing firm should group the issues under the following order: commercial bank risk profile and business environment, corporate governance and internal audit, commercial bank continuity accounts and explain explanatory notes, audit reports, and auditor communications with the bank's governing body, supervisory body, or audit committee on important issues of financial reporting and control functions, key findings and conclusions of audit procedures, oversight assessments, and actions.

The National Bank has developed a rule for mandatory audits and disclosures in the consolidated financial statements of commercial banks [12], which regulates key issues related to the audit of financial statements of a commercial bank, its relationship with the National Bank, and external audit firms. The minimum criteria for selecting an audit firm are also pre-written. The registry of the accounting, reporting and auditing supervision service of Georgia provides information on audit firms, which will facilitate banks in the process of selecting an audit firm.

Audit quality is an important part of an information disclosure system that directly affects the quality of accounting information, leading to stakeholder decisions and actions. Recent studies have shown that the personal characteristics of signatory auditors are associated with audit quality. The findings of the study "The Role of Auditors' Characteristics in Audit Qual-

ity" confirm that the diversity of signatory auditors reduces the quality of audits due to the corresponding increase of conflicts and contradictions. It has been discovered that a higher level of diversity in the audit team is associated with a lower probability of issuing non-standard audit reports, a higher probability of changing financial statements, and a higher degree of revenue management. The study has discovered that female auditors were more likely to issue altered audit opinions than male auditors. Further analysis indicates that corporate governance, the characteristics of the signatory auditor, and the audit firm reduce the impact of audit team diversity on audit quality. There are two completely different views on the role of team diversity in theoretical analysis and empirical research. Some proponents of team diversity argue that diversity leads to more knowledge and insights, which helps the team consider complex problems from different perspectives and improve the level of communication and collaboration that ultimately increases their effectiveness. Opponents of team diversity perceive such diversity as a barrier to knowledge, a source of conflict between team members, and a clash of opinions, which leads to divisions and ultimately reduces team effectiveness. [13]

Based on the above mentioned theory and research, it can be concluded that banks should pay attention to the individual characteristics of the signatory auditors while selecting an audit firm and try to reduce the diversity of auditors.

The audit firm should conduct an audit thoroughly, for example on the basis of a complete tax return rather than specific items, to reduce the chances of missing a non-compliance. As a result, the rights of consumers and investors will be better protected, the transparency of the financial situation of the banking sector will be significantly improved. The management of a commercial bank is committed to establishing effective communication with audit firms in order to conduct a quality and external audit in accordance with the principles of comprehensive international reporting on an annual basis, in order to establish an objective financial position and ensure sound management. The

recommendations developed by the supervisory authorities should be constantly updated in line with international best practices, which will improve the quality of the audit and the oversight policy. It is also important to continue the EU's active support for strengthening and developing reform in the Georgian banking sector. The banking system will be able to successfully switch to international auditing standards if Georgia faithfully fulfills its EU obligations.

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# JURISPRUDENCE

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## THE ROLE OF NEW CRIMINAL PROCEDURAL CODE IN LEGAL REGULATION OF THE CRIMINAL PROCEDURE IN THE REPUBLIC OF AZERBAIJAN

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УДК: 343.1

## РОЛЬ НОВОГО УГОЛОВНО-ПРОЦЕССУАЛЬНОГО КОДЕКСА В ПРАВОВОМ РЕГУЛИРОВАНИИ УГОЛОВНОГО ПРОЦЕССА В РЕСПУБЛИКЕ АЗЕРБАЙДЖАН

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### Abstract

The **aim** of the article is to study the role of the new Code of Criminal Procedure in the legal regulation of the criminal process in the Republic of Azerbaijan.

**Research methods:** When writing the article, methods of systematic analysis, generalization of normative scientific and practical materials, a historical approach and other methods were used. The author analyzed the data in a coordinated form using general and special scientific methods.

**The scientific novelty of the article.** For the first time in the Azerbaijani legal scientific literature, the features of the legal regulation of the criminal process were systematized on the basis of the recently ratified Code of Criminal Procedure of the Republic of Azerbaijan.

It is noted that normative legal acts that are adopted with the aim of ensuring legal regulation of various spheres of public life form the necessary legislative framework for this sphere. The legislative framework ensures the normal development of public relations with the provision of legal regulation of various issues related to the relevant field.

Emphasizing the importance of legal regulation along with various spheres of public relations, it is noted that the legal norms of the criminal process regulate issues related to the content of relevant social relations and determine the rights and obligations of participants in these relations. In this case, the procedural rules determine how it is possible to realize the rights and obligations of citizens, which are reflected in these norms. Thus, the procedural rules reflect the executive mechanism of legal norms as a guarantor of the implementation of these norms.

**In conclusion**, the author, summarizing the presented analytical material, notes that in states that have a continental legal system, normative legal acts are a source of law, therefore these states need a perfect legislative base for regulating legal relations.

It is noted that:

- The continental legal system operates in the Republic of Azerbaijan and its legal system is periodically reformed at the call of time. It is emphasized that the main objectives of the reforms are to create a rule of law in Azerbaijan, adapt legislation to the current situation and, most importantly, ensure the rights and freedoms of man and citizen;

- criminal procedure law is a procedural law, on the other hand, it belongs to state law, therefore state power plays a major role in criminal procedural relations. Before analyzing the specifics of regulation of criminal procedure law and regulatory legal acts, including in the criminal procedure legislation, it is very necessary to clarify the scope and features of criminal procedure relations.

### Аннотация

**Цель статьи** заключается в исследовании роли нового уголовно-процессуального кодекса в правовом регулировании уголовного процесса в Республике Азербайджан.

**Методы исследования:** При написании статьи были использованы методы систематического анализа, обобщения нормативных научно-практических материалов, исторический подход и др. методы. Автор анализировал данные в скоординированной форме с помощью общих и специальных научных методов.

**Научная новизна статьи.** Впервые в азербайджанской юридической научной литературе были систематизированы особенности правового регулирования уголовного процесса, на основе недавно ратифицированного Уголовно-процессуального Кодекса Республики Азербайджан.

Отмечается, что нормативно-правовые акты, которые принимаются с целью обеспечения правового регулирования различных сфер общественной жизни, образуют необходимую законодательную базу для этой сферы. Законодательная база обеспечивает нормальное развитие общественных отношений с обеспечением правового регулирования различных вопросов, относящихся к соответствующей сфере.

Подчеркивая важность правового регулирования на ряду с различными сферами общественных отношений, отмечается, что правовые нормы уголовного процесса регулируют вопросы, связанные с содержанием соответствующих общественных отношений и определяют права и обязанности участников этих отношений. В этом случае, процессуальные нормы определяют то, как можно реализовать права и обязанности граждан, которые отражены в этих нормах. Таким образом, процессуальные нормы отражают исполнительный механизм правовых норм как гаранта реализации этих норм.

**В заключении автор,** обобщая представленного аналитического материала, отмечает, что в государствах, имеющих континентальную правовую систему, нормативные правовые акты являются источником права, поэтому эти государства нуждаются в совершенной законодательной базе для регулирования правовых отношений.

Отмечается, что:

- в Азербайджанской Республике действует континентальная правовая система и его правовая система периодического реформируется по зову времени. Подчеркивается, что основными целями проведения реформ являются создание правового государства в Азербайджане, адаптация законодательства к текущей ситуации и, что наиболее важно, обеспечение прав и свобод человека и гражданина;

- уголовно-процессуальное право - это процессуальное право, с другой стороны, оно принадлежит государственному праву, поэтому государственная власть играет главную роль в уголовно-процессуальных отношениях. Прежде чем анализировать особенности регулирования уголовно-процессуального права и нормативно-правовых актов, в том числе и в уголовно-процессуальном законодательстве, очень необходимо прояснить охват и особенности уголовно-процессуальных отношений.

**Keywords:** code of criminal procedure, legal regulation, criminal procedure, continental law, legal reforms

**Ключевые слова:** уголовно-процессуального кодекс, правовое регулирование, уголовный процесс, континентальное право, правовые реформы

## Introduction

It is certain that human beings are in constant interaction with the social environment and with each other, as they are a social being and live in a society. It is very important for the order and continuity of the society to continue these social relations in peace and security. In this respect, social life needs legal peace and tranquility. The necessity of regular social relations of human beings also requires the existence of certain rules that regulate the relations of human beings with the society and with other people as a social being for the establishment of social peace and peace. People try to live in a society by putting these rules with the law and renouncing their rights and freedoms. Social peace and peace directly affect the rights and freedoms of individuals, as well as the fundamental rights and freedoms of individuals (*Yenisey F., Nuhoglu A.:2018; 15, p.69*). For this reason, the duty of law in general and criminal procedure law in particular is to protect the fundamental rights of the individual and to ensure peace and peace in society. In summary, we can say that the set of rules regulating the relations between people, the state, society and legal persons is law.

The **aim** of the article is to study the role of the new Code of Criminal Procedure in the legal regulation of the criminal process in the Republic of Azerbaijan.

Normative legal acts which are adopted for the purpose of providing legal regulation of different spheres of public life form the necessary legislative base for this sphere. The legislative base ensures the normal development of social relations with providing

legal regulation of different issues belonging to appropriate area.

In legal science, as well as in practice two types of legal norms are differed:

- Material norms;
- Procedural norms.

Material norms regulate issues related to the content of appropriate public relations and determine rights and obligations of participants of these relations. But procedural norms determine that how can realize rights and obligations which are showed in the material norms. Thus, procedural norms reflected the executive mechanism of material norms as the guarantor of the implementation of these norms.

In the states which have continental legal system, normative legal acts are the source of law, that's why these states need perfect legislative base for regulating legal relations.

According to the first paragraph of article 148 of the Constitution of Republic of Azerbaijan, legislative system consists of the following normative-legal acts::

- Constitution;
- acts accepted by referendum;
- laws;
- orders;
- decrees of Cabinet of Ministers of the Azerbaijan Republic;
- Normative acts of central executive power bodies (*Constitution of the Republic of Azerbaijan - 2016, 1, a. 148*)

This article shows that, the Republic Azerbaijan

has continental legal system. After getting independence, many reforms are carried out in Azerbaijan. The main targets of carrying out reforms are establishing legal state in Azerbaijan, adapting legislation to the current situation and most importantly providing human and citizens' rights and freedoms. When legal reforms were implemented, many codes were being adopted. The one of these codes was Criminal Procedural Code.

### Research methods

When writing the article, methods of systematic analysis, generalization of normative scientific and practical materials, a historical approach and other methods were used. The author analyzed the data in a coordinated form using general and special scientific methods.

### The scientific novelty of the article

For the first time in the Azerbaijani legal scientific literature, the features of the legal regulation of the criminal process were systematized on the basis of the recently ratified Code of Criminal Procedure of the Republic of Azerbaijan.

### Statement of the main material

Criminal procedural law is procedural law, on the other hand, it belongs to state law, that's why state powers play as a main role in criminal procedural relations. Criminal procedural law contains executive mechanism of material norms and regulates relations which appear in this sphere. Before analyzing the features of regulation of criminal procedural law and normative legal acts including in criminal procedural legislation, it is very necessary to clear the coverage and features of criminal procedural relations.

Criminal procedural law consists of norms which regulate criminal procedural relations. According to theory of law, it can approach to criminal procedural relations in two forms: wide and narrow. In wide meaning, legal relation is understood a special form of social interaction which appears objectively before the law. But in narrow meaning, legal relation is understood as one of the types of social relations which are regulated by legal norms. In this time, the participants have mutual and same rights and duties; they realize their rights and duties in a specific order protected by the state for providing their needs and interests (*State and Legal Theory. Textbook-2007*, 2, p.206).

As a each legal relation criminal procedural law consists of the following components:

- Object;
- Subject;
- Legal facts;
- Content.

A object of legal relations means that material or non-material gifts which activities of participants of legal relations directed .

A subject of legal relations means that people who attend in the legal relations and have have mutual rights and obligations. According to Criminal Code the person who has reached age of 16 and is in a condition of diminished responsibility can be a subject of criminal acts. But the person who has reached age of 14 can be

subject of:

- deliberate murder,
- deliberate causing of heavy or less heavy harm to health,
- kidnapping of the person, rape,
- violent actions of sexual nature,
- theft, robbery, extortion,
- illegal occupation of the automobile or
- other vehicle without the purpose of plunder,
- deliberate destruction or damage of property under aggravating circumstances, terrorism,
- capture of the hostage,
- hooliganism under aggravating circumstances, plunder or extortion of fire-arms, ammunition, explosives and explosives,
- plunder or extortion of narcotics or psychotropic substances,
- Reduction unsuitability of vehicles or means of communication.

As a result, the common subject of criminal procedural relations is the person who has reached age of 16 and is in a condition of diminished responsibility except cases mentioned the above.

Persons who have reached the age of fourteen at the time of the commission of a crime, but have not reached the age of eighteen, are considered minors. A person's reaching the age of eighteen is taken not from the date of his birth, but from the end of that day, that is, from the beginning of the next day. Accurate determination of the age of a minor shall be considered as one of the mandatory circumstances to be determined during the proceedings on the case against him (Decision of the Plenary Session of the Supreme Court, 13).

Legal facts are actions or events which are very necessary to be appeared legal relations. Action which reflects the features of criminal acts shall be legal facts in criminal procedural relations.

Legal content contains mutual rights and obligations of the participants of legal relations.

First of all, it is very important to determine the exact coverage of components which mentioned in the above for providing normal development and effective legal regulation of criminal procedural relations. These only can be showed in criminal procedural norms. The base of criminal procedural law is criminal procedure. The definitions of criminal procedure are different in legal literature. For some scholars, criminal procedure-related to the activities of court, organs of investigation, prosecution and is consists of legal norms which regulate relations appeared among these organs and participants of these relations (*Criminal Procedure: Common shares-2012*, 3, p. 11). In this concept, criminal procedure is characterized as a area of law. Because it is showed as a collection of legal norms. But in some scholar's opinion, "criminal procedure is a activity of a court, organs of investigation, prosecution on starting, investigation, judicial review and resolution criminal cases . This activity which directed to fulfill the obligations of justice is carried out on the basis of democratic principles and in procedural form defined by law (*Jafarguliyev, M.A.-2008*, 4, p. 6). In this meanings, criminal procedure is analyzed as a activity. In

Criminal Procedural Code criminal procedure is defined as the following:

“Criminal procedure” means the totality of procedures conducted and procedural decisions taken on criminal prosecution” (*The Code of Criminal Procedure-2016*, 5, p.7.0.3). As can be seen from here criminal procedure is defined as a collection of acts and decisions in Criminal Procedural Code.

Criminal Procedural law is an area of law showing the norms which are very necessary to do during the determination of wrongful acts. Determination is realized as a result of activities of charge, defense and judgment (*Centel, Nur-2013*, 6, p. 3.)

There are some principles which are very important to understand the purposes and the features of regulation of criminal justice. Some scholars venture to formulate as the fundamental principles of criminal justice the following list:

1. The person accused should have fair notice of the charge against him, and a fair opportunity to make answer, with the aid of witnesses and counsel.
2. The tribunal which hears his case should be so constituted as to be reasonably independent of executive or legislative dictation as to the judgment to be pronounced.
3. The sentence, in case of conviction, should be imposed by that tribunal.
4. It should be promptly and publicly made known to the convict.
5. In framing it regard should be had (a) to the nature and gravity of the offense; (b) to the intent of the offender, and the fault to be imputed to him; (c) to the natural effect of the punishment awarded, in preventing the commission of similar offenses, whether by himself or others, and in satisfying the public conscience; and (d) when not capital, to its possible utility in improving his moral character (*Baldwin, Simeon-1912*, 7, p.1).

Criminal Procedural Code of the Republic of Azerbaijan (after this CPC – G.A.) is confirmed with the “Law on ratification, entry into force and the issues of legal regulation related to it” which is adopted on July 14, 2000. This code provides to collect all the legislation on criminal procedure in the single act and allow implementing them effectively.

According to article 1.0.7 of Constitutional law on normative legal acts of the Republic of Azerbaijan, codification is the process of collecting and restating the law of a jurisdiction in certain areas, usually by subject, forming a legal code (*Constitutional law on normative legal acts-2016* 8, a. 1.0.7.).

The main purpose of Criminal Procedural Code of the Republic of Azerbaijan is showed in article 1 of the Code. The context of article is as the following:

“The legislation on criminal procedure of the Azerbaijan Republic determines whether acts which appear to be offences are criminal or not and whether a suspect is guilty or not, and determines legal procedures governing criminal prosecution and defense of suspects or accused persons as provided for by criminal law” .

In the article mentioned the above, relations included the coverage of regulation of Criminal Procedural Code. CCC is the legal base of activities of all subjects who attend in criminal procedure. CCC adopts

the main idea of The Constitution of Republic of Azerbaijan and directs to provide human and citizen’s rights and obligation. CCC regulates the professional activities of judge, prosecutor, investigator and attorneys who attend in criminal justice.

European Convention on Human Rights has been integral part of legislation of Republic of Azerbaijan since 2001 adopting of the Council of Europe. Azerbaijan accepts the type of incorporation from implementation. That is why the dominancy of international agreements is adopted in Azerbaijan. Thus, according to article 151 of The Constitution of Azerbaijan: Whenever there is disagreement between normative-legal acts in legislative system of the Azerbaijan Republic (except Constitution of the Azerbaijan Republic and acts accepted by way of referendum) and international agreements wherein the Azerbaijan Republic is one of the parties, provisions of international agreements shall dominate (*Constitution of the Republic of Azerbaijan-2016*, 1, a. 151). So protection of human rights and respecting them are the duty of CCC.

The main duties of Criminal Procedural Code are as the following:

The legislation on criminal procedure of the Azerbaijan Republic is intended:

- to ensure that a person committing an act which is considered an offence in law is detected and held criminally responsible;
- to make it impossible for officials of the prosecuting authority or judges acting on their own initiative, to unlawfully suspect, accuse or convict a person who is not guilty of an offence;
- to ensure that nobody can be illegally or needlessly subjected to coercive procedural measures or to other restrictions on human and civil rights and liberties.

As can be seen from the above, the main purpose of CCC is protection of human rights. Overall, it should be noted that, procedural law is the main provider of implementation of human rights and freedom mentioned in material norms.

Another superior feature of the Code is showing sources of the legislation on criminal procedure. The legislation on criminal procedure of the Azerbaijan Republic consists of the following:

- The Constitution of the Azerbaijan Republic;
- This Code;
- The other laws of the Azerbaijan Republic;
- The international instruments to which Azerbaijan is a signatory;

Values and the essence of public relations which form in human change in parallel with changes in social life. This also makes form and essence of criminal justice change. So, it is very necessary to change the legal norms which regulate these types of relations. From this point of view, normative legal acts have many advantages than other legal sources. Because they are very operative and react all changes.

Before analyzing the sources of legislation on criminal procedure, first of all, it is useful to explain the meaning of legal source. Legal sources- the external form of legal norms. Legal sources are special concepts which are used to combine external forms of legal



norms (*Xropanyuk, V.N.-1995*, 9, p. 95)

In the formal-logical meaning, legal sources are means of reinforcement and existence of legal norms or leader in legal practice (*The common law and state theory-2007*, 10, p. 168). Methods and forms of expression of legal acts are called sources of law in the legal meaning (*Malikova, M.F.-1988*, 11, p. 49).

It is very essential to determine legal force of normative legal acts to time, space and people for knowing of legal force of normative legal acts. Legal force of normative legal acts shows obligation of implementation to public relations.

CCC is a form of codification of law which belong to appropriate sphere of law, so it includes in normative legal acts. According to Constitutional Law on "Normative legal acts", normative legal acts – is a official document with certain forms which is adopted by state authorities on the issues belonging to their authorities defined by Constitution, law, decree and compulsory for everybody and adopted to carry out repeatedly (*Constitutional law on normative legal acts-2016*, 8, a. 1.0.1.).

According to article 3 of Criminal Procedural Code, the legislation on criminal procedure of the Azerbaijan Republic shall be in force throughout the territory of the Azerbaijan Republic without limitation, apart from the exceptions provided for in Articles 3.3 and 3.4 of this Code.

Criminal procedures and the adoption and execution of criminal procedure decisions in the Azerbaijan Republic shall be carried out in accordance with the provisions of the legislation on criminal procedure in force in the Azerbaijan Republic at the time (*The Code of Criminal Procedure-2016*, 5, a.4)

During determining personal scope of legislation on criminal procedure, first of all, it is very essential to explain the definition of citizens, foreign citizens and stateless persons.

A person having political and legal relations with the Azerbaijan Republic and also mutual rights and obligations is the citizen of the Azerbaijan Republic. A person born on the territory of the Azerbaijan Republic or by citizens of the Azerbaijan Republic is the citizen of the Azerbaijan Republic. A person is the citizen of the Azerbaijan Republic if one of his/her parents is the citizen of the Azerbaijan Republic (*Constitution of the Republic of Azerbaijan-2016*, 1, a. 52).

Foreigners - persons who are not citizens of the Republic of Azerbaijan but who possess citizenship of another country (*The law on the legal status of foreigners and stateless persons-2016*, 12, a. 2) Criminal procedure relating to foreign citizens or stateless persons who are suspected or accused of committing an offence shall be carried out in accordance with the provisions of the legislation on criminal procedure of the Azerbaijan Republic (*The Code of Criminal Procedure-2016*, 5, a. 5.1)

Constitutions of the Republic of Azerbaijan are the basis of legislative system of the Azerbaijan Republic and contain main ideas and principles which are very necessary to all area of law. For examples, there are many articles related to criminal justice: 32.4, 63, 54, 67, 68, 70 and e.g.

The title of article 63 of the Constitution is Presumption of innocence.

– Everyone is entitled for presumption of innocence. Everyone who is accused of crime shall be considered innocent until his guilt is proved legally and if no verdict of law court has been brought into force.

– A person under suspicion of crime must not be considered guilty.

– A person accused of crime does not need to prove his/her innocence.

– Proofs received against the law must not be used when administering justice.

– Nobody may be accused of crime without the verdict of law court.

The purpose of establishing the presumption of innocence in criminal procedure legislation is to ensure that no one is found guilty of a crime without a valid court verdict, that suspicious circumstances are resolved in favor of the accused, and that the prosecution is responsible for proving the person's guilt (*Ibayev V. 2004*; 16, p.386). The presumption of innocence should not be construed as a concession to criminals. On the contrary, the presumption of innocence, which protects suspects or accused persons from unlawful repression, should facilitate the prosecution and trial of real perpetrators. The presumption of innocence, assumed in principle by the law of criminal justice, is an irreplaceable right for the accused, and this right ensures that the accused is acquitted until a verdict is handed down (*Kanadoglu O.K., 2009*; 17, p.373).

Overall, the main principles and conditions of criminal justice are mentioned in the Constitution of the Republic of Azerbaijan.

The other source of criminal procedural legislation is international conventions. For instances:

– The Universal Declaration of Human Rights (10 December 1948);

– European Convention on Human Rights (4 November 1950) and additional Protocols;

– European Convention on Extradition (13 December 1957) and additional Protocols

– International Covenant on Civil and Political Rights (16 December 1966) and additional facultative protocols;

– International Covenant on Economic, Social and Cultural Rights (16 December 1966)

– The Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (10 December 1984)

– UN Convention on the Non-Applicability of Statutory Limitations to War Crimes and Crimes against Humanity (26 November 1968)

– A single convention on narcotic drugs (30 March 1961)

– Convention on psychotropic substances, (21 February 1971)

– United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, (20 December 1988) and e.g.

Many provisions detecting the criminal acts, determining the criminal responsibility, are showed in the Convention mentioned the above.

According to The Constitution and Criminal Procedural Code, the other legal source of criminal procedural law is laws. CCC has a great role to collect all legislation related to criminal procedure and as well as to regulate the criminal procedural relations. But CCC doesn't regulate all legislation which related to criminal procedure. There are also many laws that have different norms which regulate appropriate relations. They also include in the legislation on criminal procedure:

- Law on "State forensic examination activity";
- Law on "Operative-search activity";
- Law on "Intelligence and counter-intelligence activities";
- Law on "National Safety" and e.g.

It should be noted that, laws mentioned the above include in legislation on criminal procedure. That is why, including these laws in Criminal Procedural Code is very reasonable.

The decisions of The Constitutional Court also include in legal sources of criminal procedural law. Because, according to the Constitution of the Republic of Azerbaijan, Constitutional Court of the Azerbaijan Republic takes decisions as regards the questions of its competence. Decisions of Constitutional Court of the Azerbaijan Republic are obligatory all over the territory of the Azerbaijan Republic. The decisions of the Constitutional Court of the Republic of Azerbaijan shall be published (*Constitution of the Republic of Azerbaijan-2016*, 1, a 130.9). On the other hand, in some cases mentioned in 1-3, 6, 7 in the paragraphs of the part III of Article 130 of the Constitution of Azerbaijan Republic, normative legal acts may be considered invalid with the decisions of the Constitutional Court of the Republic of Azerbaijan. This case proves that, decisions of the Constitution of the Republic of Azerbaijan possess superior force and the features of normative legal acts. Although, they are showed as acts of normative character.

According to Constitutional Law on normative legal acts of the Republic of Azerbaijan, acts of normative character have the following features:

- Adopted by state organs and local self-government body;
- It is intended for a limited range of subjects;
- reflects the binding rules of conduct;
- It is intended for continuous application;
- An official document with certain forms.

From the features which mentioned the above a limited range of subjects does not conform to the decisions of the Constitutional Court. Because the decisions of Constitutional Court express obligatory instructions for unlimited range of subjects.

As a result of common analyzing, we can give such a definition of legislation on criminal procedure:

Legislation on criminal procedure- determines the legal procedure of carrying out criminal justice by courts and investigative authorities.

Criminal Procedural Code which adopted in 2000 influences on the development of legislation on criminal procedure. Because, the CCC is prepared perfectly. From 2000 Criminal Procedural Code has been changed for several times. So it helps legislation to conform to current time, relations and position.

Another superior feature of Criminal Procedural Code is regulating criminal relations thoroughly, determining exact cases which includes in the coverage of its legal regulation. It helps to use criminal procedural norms in practice easily. There are not only norms about charge but also norms about dependence.

Criminal Procedural Code consists of two parts. They are in the following:

- General;
- Special.

General part of Criminal Procedural Code is consists of these sections:

- Main provisions;
- The courts and the parties to criminal proceedings;
- Evidence and proof;
- Coercive procedural measures;
- Property matters in criminal proceedings;
- Confidentiality and time limits during criminal proceedings.

Special part is consists of these sections:

- Pre-trial conduct of the prosecution;
- Proceedings in the court of first instance;
- Proceedings in the courts of appeal and the supreme court;
- Proceedings concerning certain categories of persons;
- Special proceeding.

In the modern time, the process of integration is getting to grow day by day. It is observed by integration of state, creating different contact among the state. These processes help to develop internal and external legislation. Because we can learn the international practice and the practice of different country.

After gaining independence, the Republic of Azerbaijan, as a full member of the international community, has chosen the path of building a democratic, legal and secular state, recognizing the supremacy of universal values. Being a democratic, legal, secular republic, the state power of Azerbaijan is limited only by law in internal affairs, and in foreign affairs only by the provisions arising from international agreements to which the Republic of Azerbaijan is a party (Decision of the Plenary Session of the Supreme Court; 14).

Nowadays, international cooperation is defined as not the right but duties. All this allows to increase in the demand of perform international obligations of states in the necessary level. As noted above, international treaties which adopted by the Republic of Azerbaijan are parts of the legislation of the Republic of Azerbaijan legislation and have direct legal force in the country. In other words, the authorities who implement the law are able to rely on these treaties.

However, some international treaties, it is not possible to carry out for objective reasons. Thus, international treaties divided into two groups according to the type of instruction:

- Self-executive treaties – instructions mentioned in these contracts impose specific obligations on the State and define rights and responsibilities clearly. Thus, the state is fulfilling the obligations stipulated in

the Convention. Because the norms which are mentioned in these treaties have the mechanism of implementation and as well as responsibilities are mentioned in the contracts.

– Non-self executive- the agreements imposed obligations which have common characters on the state. These types norms don't have the mechanism of implementation well as responsibilities are not mentioned in the contracts. That's why it is very difficult for states to realize them.

International agreements are also include in the sources of the criminal procedure law.

According to article 22 of the "Constitutional Law of the Republic of Azerbaijan on Normative legal acts" "The Republic of Azerbaijan recognizes superiority of principles and norms of international law which generally accepted and ensure the compliance of the legislation of the Republic with them (*Constitutional law on normative legal acts-2016*, 8, a. 22 )

Some articles of Criminal Procedural Code deal with the necessity of implementation of provisions of international agreements. According to article 10.1 of Criminal Procedural Code, courts and participants in criminal proceedings shall conform to the Constitution of the Azerbaijan Republic, this Code, other laws of the Azerbaijan Republic as well as provisions of the international agreements to which Azerbaijan is a signatory.

According to article 122.11 of the CCC of the Republic of Azerbaijan, when the legal remedies of parties to criminal proceedings or other participants in criminal proceedings, as provided for in this Code and other laws of the Azerbaijan Republic, are exhausted, those persons shall have the right to apply to international courts for the protection of human rights and fundamental freedoms on the basis of the international treaties to which the Azerbaijan Republic is a party.

### Conclusions

Summarizing the above analysis, the importance of the Criminal Procedure Code in the development of the criminal procedure law can be grouped as follows:

– The CCC is formed from different normative legal acts. In other words, it is the codificative form of normative legal acts. It helps to collect all normative legal acts in the single acts. In its turn, it allows to regulate the criminal procedural relations more perfectly;

– There are all definitions of all concepts which used in The Criminal Procedural Code. This feature of the CCC allow to realize norms without any misunderstanding and prevent these cases;

– It has been given attention international obligation and principles mentioned in the treaties

which adopted by the Republic of Azerbaijan in CCC.

– The subjects of criminal procedural legal relations are defined clearly in CCC.

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# MEDICAL SCIENCES

## DIFFUSE LARGE B-CELL LYMPHOMA: LITERATURE REVIEW

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### Abstract

**Aim of the study:** studying the literature review about the diagnostic, clinical and treatment aspects of Diffuse Large B cell lymphoma.

**Materials and methods:** Searches were performed using Google Search, Hinari, PubMed, Z-library, NCIB, Medscape. The following criteria were used to search these databases: access to full-text articles, reports, books, and book chapters, inclusion of a combination of at least two of the terms Diffuse large B cell lymphoma (DLBCL), publication of articles during the last 10 years. The information was systematized, highlighting the clinical, diagnostic and treatment aspects of DLBCL. The bibliography of each publication was reviewed to identify any relevant sources that were not identified using the primary search strategies indicated.

**Outcomes:** The analysis of the studied articles shows that DLBCL occurs in one third of cases of non-Hodgkin's lymphoma among adults with the median age at diagnosis in the mid-60s; 30% of patients are older than 75 years of age. Although the majority of patients present without a history of lymphoma, DLBCL can arise as a transformation from an underlying known or occult low-grade B-cell lymphoma [1]. Diagnosis of large B-cell lymphomas relies on a detailed examination of tumor tissue, including immunohistochemistry, flow cytometry, fluorescence in situ hybridization (FISH), and molecular testing [1]. The treatment of patients with DLBCL is individualized according to: age, IPI, the degree of dissemination of the tumor process, the presence and type of comorbidities.

**Conclusions:** DLBCL occurs in one third of cases of non-Hodgkin's lymphoma among adults: up to 25–30% in developed countries and 30–40% in developing countries and mostly occur in the elderly though they are not restricted to any age group, with rapidly growing lymph nodes or extra-nodal masses often confined to one area. Diagnosis should be carried out in a reference haematopathology laboratory with expertise in morphological interpretation and the facilities to carry out the full range of phenotypic and molecular investigations. Age, IPI, stage of tumor, comorbidities and the viability of dose-intensified techniques should all be considered when stratifying treatment regimens.

**Keywords:** Diffuse large B cell lymphoma, lymph node, individual treatment.

**Introduction:** Diffuse Large B-cell lymphoma (DLBCL) is characterized by diffuse proliferation of atypical large lymphocytes containing a vesicular nucleus, prominent nucleoli, and basophilic cytoplasm. DLBCL occurs in one third of cases of non-Hodgkin's lymphoma among adults: up to 25–30% in developed countries and 30–40% in developing countries; these statistics make it one of the most frequent types of lymphoma in the world [1]. Large B-cell lymphomas, with an estimated 150,000 new cases annually worldwide, represent almost 30% of all cases of non-Hodgkin's lymphoma. Patients typically present with progressive lymphadenopathy, extra nodal disease, or both and require therapy [2].

The REAL classification system defined "diffuse large B-cell lymphoma" as a distinct entity DLBCL. It encompasses the Working Formulation categories of "diffuse large cell (cleaved or uncleaved)" and "immunoblastic" lymphoma, as well as the Kiel categories of "centroblastic" (diffuse) and "immunoblastic (B-cell type)" lymphoma. While it was recognized that the category most likely had multiple clinically important subtypes, it was felt at the time that there were no criteria allowing repeatable subdivision [3]. This was especially true for the morphological subdivision of large

B-cell lymphomas, which had been repeatedly demonstrated to be both unreliable in practice and lacking in prognostic differentiation.

**Materials and methods:** Searches were performed using Google Search, Hinari, PubMed, Z-library, NCIB, Medscape. The following criteria were used to search these databases: access to full-text articles, reports, inclusion of a combination of at least two of the terms Diffuse large B cell lymphoma (DLBCL), publication of articles during the last 10 years. The information was systematized, highlighting the clinical, diagnostic and treatment aspects of DLBCL. The bibliography of each publication was reviewed to identify any relevant sources that were not identified using the primary search strategies indicated.

**Results:** With a wide range of pathogenetic pathways, manifestations, and consequences, the disease is remarkably heterogeneous, which is one of the explanations for the lack of success in treatment. As a result, various prognostic predictors were established, such as the International Prognostic Index (IPI) [4]. DLBCLs are phenotypically and genetically heterogeneous. Gene-expression profiling has identified subgroups of DLBCL (activated B-cell-like [ABC], germinal-center B-cell-like [GCB], and unclassified) according to cell of origin that are associated with a differential response to chemotherapy and targeted agents [5] there have

been identified four prominent genetic subtypes in DLBCL, termed MCD (based on the co-occurrence of MYD88L265P and CD79B mutations), BN2 (based on BCL6 fusions and NOTCH2 mutations), N1 (based on NOTCH1 mutations), and EZB (based on EZH2 mutations and BCL2 translocations). Genetic aberrations in multiple genes distinguished each genetic subtype from other DLBCLs [5].

Age, IPI, and the viability of dose-intensified techniques should all be considered when stratifying treatment regimens. When possible, enrollment in a clinical trial is suggested. Precautions such as the injection of prednisone for many days as 'prephase' treatment are recommended in instances with a large tumor load to avoid tumor lysis syndrome. Avoid dose decreases due to haematological toxicity. Febrile neutropaenia warrants the use of haematopoietic growth agents on a preventive basis in patients treated with curative aim and those over the age of 60 years [6, 7]. As such, various biomarkers are required for prognostic evaluation and to identify individuals at the highest risk to aim for individualized therapeutic options [8].

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## LONG-TERM RESULTS OF COMPLETE REMOVABLE PROSTHETICS IN PATIENTS OF VARIOUS GROUPS DEPENDING ON AGE AND GEND

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### Abstract

As a result of research, it was found that changes in bone tissue prosthetic bed were most observed in patients aged 60 years and above. There were no significant differences in anatomical and topographic changes, depending on the sex of patients. Research results indicate that atrophic processes in the tissues of the prosthetic bed during the use of complete removable dentures are the most harmful factor significantly worsening the conditions for repeated patient prosthetics. It is necessary to create new structures complete removable dentures, which would reduce the negative impact on tissues of the prosthetic bed to the minimum.

**Keywords:** complete removable denture, atrophic processes, prosthetic bed tissue.

One of the most complex and urgent problems of modern orthopedic dentistry is a quality rehabilitation of patients with complete adentia [1,2]. This is due to the need to create prostheses, which are optimal in

terms of functional, aesthetic and psychological indicators of treatment outcomes the use of lamellar prostheses occurs abrasion plastic teeth and atrophy of the prosthetic bed [3,5,8]. As a result the height of the lower third, the face decreases, speech, aesthetics are

disturbed, the process of chewing food worsens. Complete absence of teeth dominates in its devastating consequences for the dentoalveolar systems among all dental diseases. Age changes mucosal conditions and the degree of atrophy of the tissues of the prosthetic bed have key to predicting the effectiveness of treatment and are a direct relationship with the duration of positive results of prosthetics.

According to WHO, the complete absence of teeth occurs in 25-40% of people over 55 years [4,7]. According to studies by different authors, in 26-55% of patients atrophy of the alveolar processes of the jaws is pronounced, which in turn, worsens the fixation of complete removable dentures [6] dental implants. We noted that after repeated prosthetics were most often treated by patients of older age groups. Considering the

above, the aim of our study was study of changes in the anatomical and topographic features of tissues prosthetic bed in different age groups in patients using complete removable dentures.

Materials and methods of research.

We examined 120 patients with complete secondary adentia who applied to the clinic for repeated prosthetics. All patients were divided into three age groups: the first 40-54 years old, the second 55-70 years old and the third is over 70 years old. According to statistics, this amounted to – 82 (68.33%) men and 38 (31.67%) women from among those who applied for a second prosthetics. Additionally, factors such as the absence general somatic pathology, absence of inflammatory processes and injuries oral cavity, bad habits.

Table 1

All patients were divided according to the type of bone tissue atrophy of the prosthetic bed in depending on age and gender.

Groups			jaw atrophy by classification						
			to Schroeder			To Keller			
			I	II	III	I	II	III	IV
40-54 years	man	№	4	1	-	7	-	1	-
		%	80%	20%	-	87.5	-	12.5	-
	Woman	№	8	2	-	1		1	1
		%	80%	20%	-	33.33		33.33	33.33
55-70 years	man	№	12	16	3	1	18	2	1
		%	38.7%	51.6	9.7	4.55	81.81	9.09	4.55
	Woman	№	13	23	3	6	24	5	1
		%	33.33%	58.98	7.69	16.66	66.66	13.88	2.77
over 70 years	man	№	1	2	2	2	6	4	2
		%	20%	40%	40%	14.28	42.88	28.57	14.3
	Woman	№	2	20	8	7	22	5	3
		%	6.66	66.66	26.68	18.91	59.48	13.51	8.1
Total	man	№	17	19	5	10	24	7	3
		%	41.46%	46.34%	12.2	22.72	54.54	15.9	6.84
	Woman	№	23	45	11	14	46	11	5
		%	29.11%	56.96	13.93	18.42	60.52	14.49	6.57

To determine the degree of atrophy of the bone tissue of the prosthetic bed used intraoral examination, studied diagnostic models jaws and used scanning and measurement of digital indicators on virtual models. To determine the degree of jaw atrophy used the classification according to Schroeder and Kohler.

#### Results and its discussion.

The results of the survey show that in 87% of patients with complete absence of teeth in the upper jaw belong to class I and II according to Schroeder classification, which is considered a satisfactory condition for prosthetics. Satisfactory clinical conditions for prosthetics on the lower jaw were found only in 20% of

cases. In 58.3% of individuals, uniform atrophy of the alveolar process was noted, which corresponds to type II according to Koehler. The survey results revealed that the age of patients has a significant impact on the processes of atrophy tissues of the prosthetic bed, namely in II and III age groups.

The condition of the mucosa was assessed according to the Supple classification. Among of the examined patients, predominantly normal compliance of the mucous membrane, which corresponds to class I according to Supple (36.66%). In 32.5% of cases - class II according to Supple, class III according to Supple - in 10.0% observations, class IV 20.8%

Table 2

The state of the mucous membrane of the prosthetic bed, depending on age and gender

groups			mucosal classification according to Supple			
			I	II	III	IV
40-54 years	Man	No	3	1	2	-
		%	50	16.67	33.33	
	woman	No	2	1	1	3
		%	28.57	14.29	14.29	42.85
55-70 years	Man	No	13	10	3	3
		%	44.83	34.49	10.34	10.34
	woman	No	22	9	4	8
		%	51.16	20.94	9.3	18.6
over 70 years	Man	No	-	4	1	1
		%		66.67	16.67	16.66
	Woman	No	4	14	1	10
		%	13.8	48.28	3.44	34.48
total	Man	No	16	15	6	4
		%	39.02	36.59	14.64	9.75
	woman	No	28	24	6	21
		%	35.44	30.38	7.6	26.58

The results of the examination that the condition of the oral mucosa practically does not differ by gender. In the age group 70 and there is an increase in patients with the second class of classification mucous membrane.

According to the data obtained, 87% of patients with complete absence of teeth, have satisfactory conditions for the manufacture of complete removable prostheses. At the same time, the favorable clinical situation regarding lower jaw was observed only in 20% of cases. According to examination shows that the atrophy of the tissues of the prosthetic bed is significantly increases in older age groups.

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## PET/CT IN THE MANAGEMENT OF LYMPHOMAS

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**Abstract**

Over the last few decades, advancements in medical imaging have increased the quality and efficiency of medical diagnosis. The selection of distinct imaging methods for distinct objectives aids in streamlining and improving one method's scope without necessarily replacing the other [1]. Molecular imaging with positron emission tomography (PET) with tumor-targeting radiopharmaceuticals has achieved widespread acceptance in oncology and offers a variety of clinical uses [2].

Combining PET with CT technology significantly improves imaging. FDG-PET and CT imaging techniques, respectively, give functional and anatomical information. Combining the two modalities can compensate for their individual disadvantages, and the combined technique surpasses either FDG-PET or CT alone for malignant lymphoma diagnosis, staging and assessment [3].

**Keywords:** lymphoma, PET/CT, 18F-FDG, molecular imaging.

Current designs incorporate a CT scanner alongside a PET scanner, with both systems sharing a single patient bed. Although the scanner looks to be a single device from the outside, there is slight or no mechanical integration on the inside. CT images are obtained first and used to develop attenuation correction factors that will be applied to the PET

data to account for photon attenuation. PET data are then obtained for the same axial extent of the patient using a simple horizontal translation of the bed. After the scan is complete, co-registered CT and PET images are accessible for examination independently or in fused image mode with customizable data blending from the two modalities [3].



Figure 1. Showing CT scan, PET scan, and PET/CT scan.

FDG-PET/CT is the current gold standard for lymphoma imaging and plays a critical role in therapy decisions. Accurate staging is critical for selecting the most appropriate therapy: FDG-PET/CT can uncover lymphoma areas missed by CT alone and help avoid under-treatment of individuals with advanced disease stage who would have been misclassified as having limited stage disease on CT. FDG-PET/CT has demonstrated superior diagnostic performance over CT, because this functional imaging is capable of identifying tumor lesions with increased glucose metabolism even when no substantial abnormalities are found on CT.

Advances in molecular imaging with 18F-FDG PET have facilitated the use of imaging in lymphoma patients not only for diagnosis and staging, but also for response assessment [4,5]. At the moment, functional imaging with FDG PET/CT is frequently performed in patients with FDG-avid lymphoma, but indications

vary according on the individual diagnosis and presentation. A baseline scan is always indicated before to therapy to allow for meaningful comparisons later.

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## THE ROLE OF PATHOLOGICAL ANATOMICAL STUDY OF FIBROMIOMA MATERIALS REMOVED BY SURGERY IN DETERMINING DIAGNOSIS

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## РОЛЬ ПАТОЛОГО-АНАТОМИЧЕСКОГО ИССЛЕДОВАНИЯ МАТЕРИАЛОВ ФИБРОМИОМ, УДАЛЕННЫХ ХИРУРГИЧЕСКИМ ПУТЕМ, В ПОСТАНОВКЕ ДИАГНОЗА

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### Abstract

Treatment of benign uterine fibroids and delayed complications in women of different ages remains one of the most pressing problems in gynecology. As the most common disease among women of reproductive age, the incidence of uterine fibroids varies from 10 to 30%. Although fibroids are generally found in 1-5% of women during prophylactic screening, practice shows that this figure rises to 30-35% among gynecological patients. Pathomorphological examinations (examination of corpses) revealed another fact: 77 out of every 100 women who died found uterine fibroids, which is a very serious concern for doctors.

### Аннотация

Лечение доброкачественной миомы матки и поздних осложнений у женщин разного возраста остается одной из актуальных проблем гинекологии. Как наиболее распространенное заболевание среди женщин репродуктивного возраста, заболеваемость миомой матки колеблется от 10 до 30%. Хотя при профилактическом осмотре миому обычно обнаруживают у 1-5% женщин, практика показывает, что среди гинекологических больных этот показатель возрастает до 30-35%. Патоморфологические исследования (осмотр трупов) выявили еще один факт: у 77 из каждых 100 умерших женщин обнаружены миомы матки, что вызывает очень серьезную озабоченность врачей.

**Keywords:** uterine tract, ovary, uterus, fibromyoma, fibroid, fibroma

**Ключевые слова:** маточные пути, яичник, матка, фибромиома, миома, фиброма

Fibromyomas (fibroids, leiomyomas) are a common disease in women of reproductive age. Fibroids are also known as fibroids, leiomyomas, and fibroids. Fibromyomas are the cause of heavy bleeding during menstruation. Studies show that black women have a higher risk of developing fibromyoma in their lifetime than white women [2].

Fibroids cause severe or prolonged menstrual bleeding. This, in turn, results in anemia in women of reproductive age. Bleeding due to fibroids can also be observed in postmenopausal women. However, bleeding in the female population at this age requires a serious examination and exclusion of endometrial hyperplasia, carcinoma (malignancy) and other similar diseases. Large fibroids and enlarged uterus in themselves cause abdominal symptoms as a result of "mass" (even 16 kg) [3,p.117]. Among these symptoms, dysfunction of the gastrointestinal and urinary systems is common.

Painful menstruation, non-menstrual pelvic pain, infertility, and recurrent miscarriages are also symptoms that can be caused by fibromyoma. However, it should be noted that many fibromyomas are asymptomatic. In some women with symptomatic fibromyomas, severe menstrual bleeding due to fibromyomas resolves after the onset of menopause. Also, in postmenopausal women, fibroids often shrink and become smaller, and improvements of symptoms caused by fibromyomas are observed [6].

Uterine fibroids are benign tumors that develop from the walls of the uterus, immature myocytes. The number of these derivatives can be one or more. Sizes vary: from rice to grapefruit (citrus). The fibroid is either located in the wall of the uterus, or goes out with a thin leg. Unless the fibroid grows and compresses the surrounding tissues, it becomes asymptomatic, i.e. it does not show any symptoms. Fibroids on the foot are sometimes twisted. In this case, there is no blood flow

to the resulting nodule, resulting in severe pain that requires urgent surgery.

Women get the disease at a young age. Fibroids usually appear between the ages of 30 and 45, and during menopause they can become smaller and sometimes disappear. Fibroids, which are benign tumors by nature, rarely worsen. But it is important to know that large fibroids can cause false pregnancies or infertility [7].

Uterine fibroids develop from muscle tissue with connective tissue and blood vessels in their structure, so they are called differently, depending on the ratio of parenchyma (muscle tissue) and stroma (connective tissue): fibroids, fibroids, fibromyoma, leiomyoma.

This problem, which worries women around the world, is the focus of medical science. Scientists are constantly researching and finding new ways to protect the health of the fairer sex.

Fibroids differ from each other in the following ways:

- There are numerous intermediate variants of fibroids according to their localization (subcutaneous, intramuscular, sublingual);

- can be in the form of small, medium and large tumors according to their size;

- found in the bottom, body and neck of the uterus due to its location;

- due to the nature of development, there are real growths associated with circulatory disorders, pseudo-growth associated with edema and proliferation of the mucous membrane;

- due to their morpho-histochemical properties, they can be simple and proliferating (growing, thickening of the nodules in the uterus as a result of an increase in the number of cells).

According to scientists, uterine fibroids are the most common disease among women of reproductive age, ranging from 10 to 30%. Although fibroids are generally found in 1-5% of women during prophylactic screening, practice shows that this figure rises to 30-35% among gynecological patients. Pathomorphological examinations (examination of the dead) revealed another fact: it was found that 77 out of every 100 women who died had uterine fibroids, which is a very serious concern for doctors [8, p.8].

Fibroids are rare in women in their 20s and 30s. At that age, fibroids are found with a probability of 0.9% to 1.5%, which is usually due to hereditary factors, and genetic codes play the role of hereditary carriers.

As you grow older, the incidence of fibroids increases. According to medical statistics, the most common period of this disease is 35-45 years, and the average age of its occurrence is 32-33 years. Like other tumors, fibroids do not appear all of a sudden. Their formation and development occur in conjunction with pathologies of other organs and tissues of the reproductive system, i.e. disorders of the ovaries, endometrium (endometrium), mammary glands, cervix and neuroendocrine system regulating reproductive function are observed with the dysfunctions of thyroid and adrenal cortex. If we consider that the average development period of fibroids is about 5 years, it turns out that these tumors are usually in their 30s, caused by chronic somatic

(liver, gastrointestinal and cardiovascular system) and gynecological (salpingo-oophoritis, endometritis) diseases or neuroendocrinological changes. begins to form in the period of its occurrence. Stresses experienced by a woman, such as a miscarriage or itching of the uterus, are also considered a pre-morbid background, i.e. they create a fertile ground for the disease. At the age of 30, the accumulation of pathological factors leads to mutations in the cells of the reproductive system, which leads to the formation of fibroids.

Further development of the derivative depends on the gradual increase and accumulation of risk factors. These risk factors include the absence of childbirth before the age of 30, long-term inadequate contraception (use of contraceptives), inflammatory diseases of the uterus and growth, stress, solar isolation, ovarian cysts, etc. special mention should be made. 40-45 years is the age when fibroids are most often operated on (in most cases, the uterus is completely removed). In this case, the main indications forcing the doctor to operate may be the rapid growth or large size of the fibroid, or its detection in conjunction with other gynecological diseases. That is, if the patient is found pathology of the endometrium and ovaries along with fibroids, then there is no other effective way of treatment, the most optimal way is surgery. Since childhood fibroids are mainly dyshormonal (hormone-dependent, hormonal changes in the body), the growth of fibroids in the post-menopausal period coincides with the accumulation of factors that cause somatic mutations in cells and hormone-dependent organs and tissues. During this period, there is a functional strain of the neuroendocrine system that regulates the reproductive system in women, along with a decrease in the hormonal activity of the ovaries, there is an increase in the production of gonadotropic and corticotropic hormones [4, p.77]

In the first 2 years after the onset of menopause, regression and complete disappearance of myomatous nodules occur. However, in some patients, about 10-15% of uterine fibroids are not absorbed. They enter the menopause with large fibroids, in which the size of the uterus corresponds to 14-16 weeks of gestation. In addition to fibroids, endometrial hyperplasia (ovarian enlargement), ovarian cysts and cystomas, endometriosis, and other stimuli are also common in such patients.

It has long been believed that the cause of uterine fibroids is hyperestrogenism, hyperhormonemia, as well as deficiency of the luteal phase of the menstrual cycle and associated progesterone deficiency, chronic anovulation and increased production of gonadotropic hormones. Although the etiological factors of childhood fibroids have not been fully elucidated due to research conducted by scientists around the world, important results have been achieved. Clinical and genealogical examination of patients with fibroids revealed the presence of hereditary high levels of neuroendocrine and oncological diseases. Scientists believe that the predisposition to fibroids is based on the combined effect of multifocal factors, especially genetic and environmental factors. It is interesting to note that ethnic factors also play an important role among the risk factors for uterine fibroids. For example, blacks (those of African-American Negro descent) are two to three

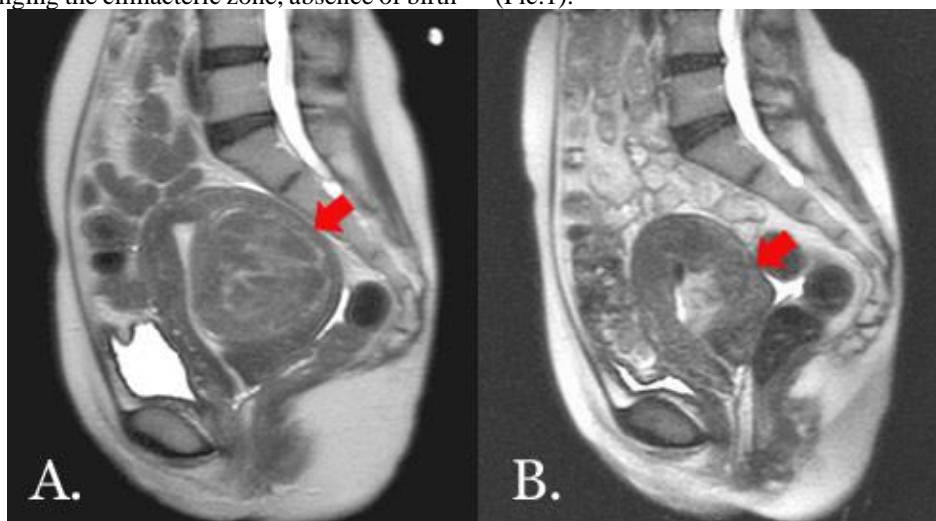
times more likely to develop the disease than whites. It is also common for blacks to have earlier menarche (early onset of menstrual function) and excess body weight [5, p.8].

It should be noted that the high number of births reduces the likelihood of fibroids. On the contrary, abortion increases the likelihood. Although the age of the first pregnancy does not matter in this process (it is better to have the first pregnancy in the 20s), the late birth (after the age of 30) significantly reduces the likelihood of developing the disease. Currently, families (especially in urban areas) prefer to be content with one or two children. Of course, this is due to many objective and subjective factors. However, we must not forget that nature has given women a unique quality, such as the ability to reproduce, and this quality is also a guarantee of women's health. If women can afford it, they should not be afraid to have many children, even after the age of 30. Because it can protect them from many diseases.

Fibromyomas can be included in the group of diseases of civilization. In addition to the factors listed above, other factors can cause fibroids such as living in the city, changing the climacteric zone, absence of birth

in the anamnesis, abortions, presence of one or both hypertension and diabetes, especially the occurrence of these diseases under the age of 35 and lasting 5 years or more, eating a lot of meat, obesity. It is important to remember that being overweight is an indisputable and major risk factor for uterine fibroids. Women weighing more than 70 kilograms are three times more likely to develop the disease than those weighing 50 kg or more. It should be noted that every 10 kg increase in body weight during obesity increases the probability of fibroids by 21%. In the vast majority of patients with fibroids, adipose tissue accumulates in the upper half of the body. As an independent risk factor, excess body weight plays an important role, especially in the late reproductive period. Taking high doses of estrogen-containing medications can also cause fibroids.

MRI imaging with gadolinium contrast may help to identify devascularized (degenerated) fibroids, as well as the location of fibroids along endometrial and serous surfaces. It should be noted that the localization of fibroids for endometrial and serous membranes is of particular importance in terms of the choice of treatment methods based on the maintenance of the uterus (Pic.1).



*Picture 1. MRI imaging of fibroids with gadolinium contrast*

Although annual intravaginal US examinations have been used in some cases to detect fibroids, no high-quality clinical studies have been performed to confirm the benefits of such an approach. The results of some observational studies of the natural course of fibroids suggest that they may shrink or grow significantly. Studies also show that rapid growth of fibroids can sometimes be observed, but this is not an indication for their treatment.

Although childhood fibroids are widespread and play an important role in health care costs, very few clinical studies have been performed on their treatment. However, because the size, number, localization, and clinical manifestations of fibroids vary widely among women, the choice of treatment should depend on the clinic of the fibroids. Symptoms also affect the choice of therapy. The short- and long-term benefits of treating asymptomatic or asymptomatic fibroids have not been confirmed in clinical trials.

In menopausal women who do not want to become pregnant in the future, symptomatic fibroids are often treated with hysterectomy. Hysterectomy is the only method that prevents recurrence of fibroids. In addition to fibroids in women with co-morbidities, including adenomyosis and cervical neoplasia (neoplasm of the cervix), hysterectomy can also be used to treat these diseases. Observational studies of women who have had a hysterectomy show a significant improvement in quality of life 1 to 10 years after surgery.

Hysterectomy can be performed by abdominal, vaginal and laparoscopic methods, as well as robotic surgery. Vaginal hysterectomy has fewer complications. However, in some women, the size of the fibroids may not allow for vaginal hysterectomy. Studies show that endoscopic surgery is associated with fewer cases. However, when deciding on endoscopic surgery, the possibility of intra-abdominal dissemination of an undiagnosed potentially malignant tumor should be con-

sidered when using the method of intra-abdominal removal of the uterus (Eng. Morcellation). The US Food and Drug Administration recommends that morsellation be performed only in hysterectomies in premenopausal women and that the risks of the method be fully explained to these women [1,p.76].

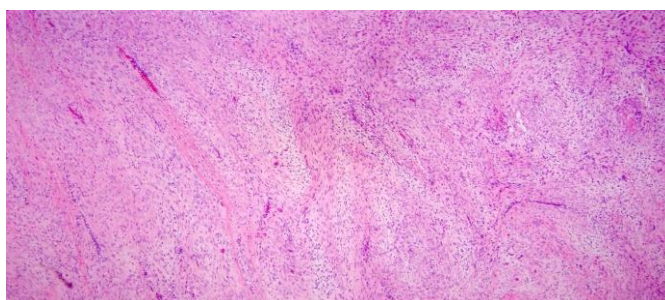
Side effects are common in women who have had a hysterectomy. One study in the United States found that 28% of women who underwent abdominal hysterectomy had surgical or medical complications (severe blood loss, surgical wound complications, and fever) and that blood transfusions were required in 10% of cases.

Although the number of hysterectomies has recently decreased, hysterectomy is used in 3/4 of all fibroids in the United States. In many countries, there are

concerns about the need for and unnecessary use of hysterectomy, as well as interventions to preserve the uterus.

The actuality of the problem. Treatment of benign uterine fibroids and delayed complications in women of different age groups remains one of the most pressing problems in gynecology.

Clinical material and methods. Microscopic examination of biopsy materials obtained as a result of fibromyoma operations in hospitals of the Nakhchivan Autonomous Republic was carried out in the pathohistological laboratory of the Forensic Medical Expertise and Pathological Anatomy Association and the results were evaluated.



Picture 2. Fibromyoma – micropreparation

The purpose of the study. The aim was to clarify the accuracy of diagnoses and prevent future complications. According to the information provided by this laboratory, during twelve months of 2021, 212 biopsy

materials (surgically removed) were surgically examined in the hospitals of the Nakhchivan Autonomous Republic with a diagnosis of fibromyoma and microscopically examined in the pathohistological laboratory.

Table 1

Microscopic examination of biopsy materials obtained from operations

The name of pathological process	number
Adenomyosis	10
Degenerative leiomyoma	30
Endometrial polyp	19
Endometrial hyperplasia	26
Endometrial atrophy	14
Endometrial carcinoma	3
Simple leiomyoma	110
Total	212

Discussion of results. The results of the study revealed the following characteristics of uterine fibroids:

- uterine fibroids are the most common tumors among women, especially in the late reproductive period (35-45 years) and premenopausal period (46-55 years);
- These tumors can develop during menopause, may shrink or even disappear completely (naturally or artificially);
- fibromyoma is able to maintain a stable size for a long time, but at the same time can grow slowly or rapidly, and even grow very fast;

This disease is characterized by various symptomatic and asymptomatic clinical variants (the patient may be anxious, complain, may be completely unaware of the tumor in childhood, and the complaints are of a

different nature). The results were compared with previous years and there was an increasing trend of surgical uterine fibroids among women. Recently, operations have been performed that result in amputation of the uterus. Early examination and correct diagnosis can result in correction of endometrial hyperplasia (26) and endometrial atrophy (14) without surgery. Thus, if a biopsy is taken before surgery, the diagnosis will be more accurate, as well as the nature of the operation and the normal functioning of women's reproductive functions.

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## METABOLIC ROLE OF GLUTATHIONYLATION/DEGLUTATHIONYLATION

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### Abstract

Glutathione (GSH) is a tripeptide comprised of cysteine, glutamate, and glycine. GSH is a reducing molecule that interact with reactive oxygen species to neutralize the unpaired electrons that make them highly reactive, which is why it is the most important low molecular weight antioxidant in cells.[1] Due to its antioxidant action, GSH is involved in prevention of proteins, enzyme and DNA damage, lipid peroxidation and membrane destruction, etc. Recently, other functions of GSH have been identified. ) It is normally present in the liver at a concentration of 10 mmol l<sup>-1</sup>. Glutathione (GSH) is the most important low-molecular-weight antioxidant synthesized in cells, as it is a reducing molecule which can react to oxygen species by neutralizing the unpaired electrons that make them highly reactive and dangerous. GSH-dependent thiol-disulfide reactions, which occur permanently in cells, lead to the formation and reduction of mixed disulfides, including the glutathionylation/deglutathionylation of proteins. Glutathionylation of the cytoskeletal proteins (vimentin, myosin, tropomyosin, cofilin, profilin, and actin), enzymes (enolase, aldolase, 6-phosphoglycolactonase, adenylate kinase, phosphoglycerate kinase, and HSP60), fatty acyl carrying protein, nucleophosmin, transgelin, galectin, etc., growth factors and cytokines, etc. has been reported

The glutathionylation/deglutathionylation is catalyzed by a complex network of thiol/disulfide oxidoreductases. Glutaredoxins are new members of the GSH-dependent thiol/disulfide oxidoreductase family, which catalyze the oxido-reduction of disulfides or mixed disulfides of GSH in the presence of NADPH and GR. The need for GSH to carry out such reactions was the reason why this compound was given the role of "catalyst of thiol-disulfide metabolism".

S-glutathionylation is a fast and flexible mechanism of posttranslational modification of proteins, a process of vital importance, given its role in maintaining the optimal three-dimensional structure of proteins .

**Keywords:** Glutathione, Glutathionylation/de-glutathionylation, S-glutathionylation, glutathione functions

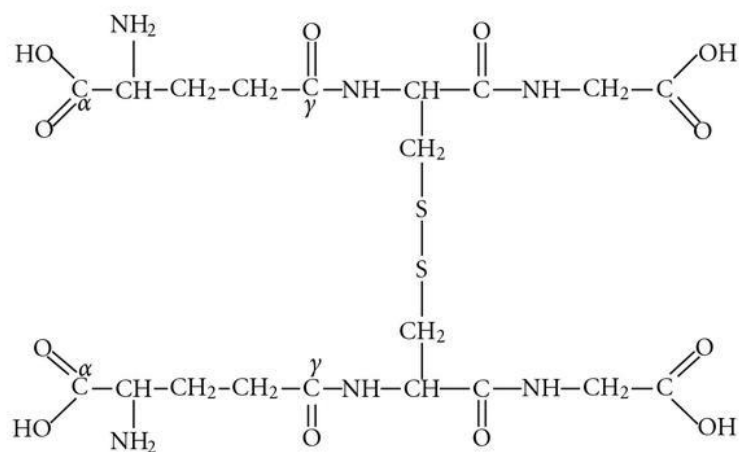


Figure 1. Glutathione is a tripeptide: L--glutamyl-L-cysteinyl-glycine.

In its reduced form (a) the N-terminal glutamate and cysteine are linked by the -carboxyl group of glutamate, preventing cleavage by common cellular peptidases and restricting cleavage to -glutamyltranspeptidase. The cysteine residue is the key functional component of glutathione, providing a reactive thiol group that plays an essential role in its functions. Furthermore, cysteine residues form the intermolecular dipeptide bond in the oxidized glutathione molecule (b).[4]

Glutathione is an important regulator of intracellular metabolism. It is synthesized in the cytosol of all body cells and is available to organelles. Glutathione itself plays a key role in the antioxidant protection of cells, regulation of apoptosis and biliary excretion, conjugation to accelerate the elimination of many xenobiotics and endobiotics. Glutathione protects every one of our cells and affects almost every system, especially the immune, nervous, gastrointestinal systems and lungs. It is essential for metabolic and biochemical reactions in the body, such as DNA synthesis and repair, protein synthesis, prostaglandin synthesis, amino acid transport, and enzyme activation. Maintaining high levels of glutathione provides reliable non-specific antiviral protection, regardless of the type of virus.

### Results

GSH-dependent thiol-disulfide reactions, which occur permanently in cells, lead to the formation and reduction of mixed disulfides, including the glutathionylation/deglutathionylation of proteins. Glutathionylation of the cytoskeletal proteins (vimentin, myosin, tropomyosin, cofilin, profilin, and actin), enzymes (enolase, aldolase, 6-phosphoglycolactonase, adenylate kinase, phosphoglycerate kinase, and HSP60), fatty acyl carrying protein, nucleophosmin, transgelin, galectin, etc., growth factors and cytokines, etc. has been reported. Glutathionylation was recognised as one of the physiologically relevant mechanisms of posttranslational modification of certain proteins. Exposure of cysteine residues of proteins to ROS leads to their oxidation with the consequent formation of stable sulfenic, sulfinic, or sulfonic acid derivatives and unstable transient forms. The glutathionylation process is thought to be responsible for the anticancer effect of PABA/NO [O2-{2,4-dinitro-5-[4-(N-methylamino)benzyloxy]phenyl}-1-(N,N-dimethylamino)diazene-1-ium-

1,2-diolate][2]. Glutathionylation/de-glutathionylation is also a mechanism of regulation (activation/inhibition) of cellular signaling pathways and metabolic processes [3].

The glutathionylation/deglutathionylation is catalyzed by a complex network of thiol/disulfide oxidoreductases. Glutaredoxins are new members of the GSH-dependent thiol/disulfide oxidoreductase family, which catalyze the oxido-reduction of disulfides or mixed disulfides of GSH in the presence of NADPH and GR. The need for GSH to carry out such reactions was the reason why this compound was given the role of "catalyst of thiol-disulfide metabolism".[4]

S-glutathionylation is a fast and flexible mechanism of posttranslational modification of proteins, a process of vital importance, given its role in maintaining the optimal three-dimensional structure of proteins and contributing to the performance of specific functions in various conditions at different vital stages. S-Glutathionylation is thought to be one of the mechanisms preventing ROS-induced irreversible protein inactivation under oxidative stress insults. During recovery, GSH residues can be removed from the glutathionylated proteins resulting in restoration of their functional activity.

### Conclusions

Glutathione displays remarkable metabolic and regulatory versatility, which poses the tripeptide at the center stage of a multitude of cellular processes important in health and disease.

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# PEDAGOGICAL SCIENCES

## INTERACTIVE METHODS IN LANGUAGE TEACHING

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## ИНТЕРАКТИВНЫЕ МЕТОДЫ В ОБУЧЕНИИ ЯЗЫКАМ

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### Abstract

The article elaborates the most actual language teaching method which is called "interactive". Interactive method has been compared and contrasted with active and passive methods that don't often lead to efficiency in teaching. Teachers' and students' roles in the class have been identified clearly while working in this method. The article also underlines the shapes of classroom and objects found in the classroom which may have different impact on the students.

Besides, characteristic features of learning process have been researched in the study.

### Аннотация

В статье разрабатывается наиболее актуальный метод обучения языку, который называется «интерактив». Интерактивный метод сравнивался и противопоставлялся активным и пассивным методам, которые не всегда приводят к эффективности обучения. При работе по этому методу четко определены роли учителей и учеников в классе. В статье также подчеркивается форма классной комнаты и предметы, найденные в классе, которые могут по-разному влиять на учащихся. Кроме того, в исследовании исследованы характерные особенности процесса обучения.

**Keywords:** interactive, method, approach, interaction, passive, active, technology

**Ключевые слова:** интерактив, метод, подход, взаимодействие, пассив, актив, технология

Different methods are used in teaching including passive method, active method, interactive method and so on. This article will elaborate the topic of Interactive method in language teaching. The passive method is the product of the past and is no longer used. However, it is still practiced by some teachers. In this method, the student only listens to the lesson and the teacher speaks at the lesson. But over the years, an active method has emerged. When this method was developed, teachers who used the passive method opposed it, but over time, they also tried to use the active method.

The active method has been used in teaching by developed countries for many years. However, this method is still widely used in Azerbaijan. The passive method was more widely used in the Soviet education system. Only the teacher could speak during the lesson. Although years have passed, the impact of that education system is still evident. In the active method, when the teacher speaks, any student joins the discussion of the topic and there is an activity in the classroom. In the past, the rule was that the student could not ask any questions or join in the discussion while the teacher was speaking. But in the active method, they were left behind. In the active method, when the teacher explains the topic, the student also expresses his / her attitude, can ask questions, and the topic is discussed in a reciprocal way. This is a good method for both the student and the teacher. The active method has long played an

important role in the world education system, but developed countries no longer use it. Because an interactive method has already been developed. Interactivity as a pedagogical technique requires a fundamental change in the way education is delivered [3].

The educational experience of developed countries shows that the best way to train modern people is to use student-oriented interactive teaching methods that accept the student not as an object of learning in the classroom, but as a subject. The interactive method is already used as the main method in European education. In this method, during the discussion of the topic, along with the discussion between the teacher and the student, there is also a discussion among the students. Along with their intrinsically engaging properties, games have been touted for their ability to teach ill-defined problem-solving skills, elicit creativity, and develop leadership, collaboration, and other valuable interpersonal skills [1]. For example, a teacher teaches a lesson on any subject. An indication of the interactive method is the start of discussions among students during the lecture. The teacher should have computer knowledge for an interactive method. In other words, technology must be seen as cognitive prosthetics. [2]. You also need to be a modern-minded teacher so that you can apply the interactive method in your teaching.



Of course, it is important to use the interactive method in all lessons. But it is more important in language classes. First of all, language lessons should be discussed. Not only teachers but also students should discuss among themselves. It is necessary to use the computer field, watch various short films, listen to music, and do practical work. In general, it is not easy to organize students to be active in English lessons, it depends on the teacher's skills. Sometimes we see a teacher teaching a topic in such a way that the student is satisfied, but another teacher teaches the same topic in such a way that the student does not want to sit in class. The main need of today's young learners is the interactive method. Therefore, it is possible to achieve better results if the teaching as a whole prefers the interactive method. Because this method has already been tested.

The interactive learning process should be organized in such a way that students acquire knowledge through research. In this training process, the class (audience) is searched for solutions to the problem in the form of groups and pairs, the groups record the results on worksheets, and then present it. After the presentations, the results of this research are linked, the data is systematized and classified in a general way. These results are then compared with the assumptions made by the students (audience) at the beginning of the study. Students (learners) observe what overlaps and what is new and come to a common conclusion.

Interactive learning can be considered as a set of methods of organizing and managing teaching and cognitive activity. The following aspects may be characteristic of interactive learning:

- the teacher consciously (voluntarily) creates a situation of cognitive problems;
- Stimulation of active research position of students in the process of problem solving;
- creating conditions for students to independently discover, acquire and master new and necessary knowledge.

The essence of the new approach is that the training is aimed not only at enriching students' memory with new scientific knowledge (information), but also at the independent acquisition and mastering of more knowledge, the acquisition of the most important skills and habits, personal qualities and abilities. In this case, under the guidance of the teacher, students learn to identify cause-and-effect relationships, regularities, draw conclusions, make important and in-depth generalizations in the process of studying the most important learning material, especially selected, easy to understand and remember.

The position of the student in the process of interactive learning is the position of "discoverer", "researcher"; he deals with the issues and problems to the best of his ability in an independent research process. Students are not passive listeners in the learning process, but active thinkers, speakers, commentators, we act as a subject, a full participant in the learning process, a researcher, and acquire knowledge in the process of active search and discovery.

Interactive learning is a democratic process of learning that helps to acquire knowledge, skills, experience and habits, the development of social and intellectual thinking, independent work, independent thinking skills necessary for the citizens of society. While interactive learning involves inter-student learning-teaching communication and collaboration, teacher-student union and collaboration, interactive methods are methods, techniques, practices, approaches, tools that enable students to acquire learning and understanding, skills and qualities in the learning process. The results of the latest research show that interactive teaching methods give effective results with the close application of ICT in training, referring to the theory of constructivism, and make their work more effective. Psychologists note that information is stored in the memory of 10% of what a person hears, 50% of what he sees, and 90% of what he does. Great support of ICT in this area is in providing the learner with a strong information bank during personal research (internet, e-books, tests and assignments, etc.).

Interactive teaching methods also require the abandonment of the usual design of the classroom, the usual way of organizing classes. There are four main forms of placing student desks in the classroom:

1. "Class" form - a traditional rule.
2. "Cafe" form ("discussion club").
3. Class in the form of the letter "U".
4. Class in the form of a "circle".

The "cafe" uniform is suitable for working in groups. The letter "U" is more effective during role-playing games, dating, and discussions. The "circle" form is more convenient for holding various discussions and round tables.

All the methods used are based on the regularities of the learning process, which consists of the following components: a) the purpose of training, b) the content of training, c) students' comprehension, d) teacher's teaching activities and students' learning, organizational form of training, etc. d) learning outcome. All these components are interrelated and work together in the learning process. They are stable and repetitive. Hence such an important requirement - it is necessary to take into account the interaction of these components in the identification and application of any training methods, tools and forms. The teacher must not forget that these connections exist throughout the teaching process. Without this, it is impossible to achieve the desired result.

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**ENGLISH AS THE MEDIUM OF INSTRUCTION IN THE IMPLEMENTATION OF  
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English, as a global language, has become an essential part of today's globalization era and global language skills is one of the fundamental skills that one must have in fields such as economics, health, military and education.

This article discusses that studying the concept of science as chemistry prepares students to participate in the modern era. The author reveals that learning presented in foreign language can have a positive impact on the students.

**Keywords:** interdisciplinary connection, medium of instruction, chemistry, implementation, scientific language.

Interdisciplinary connections are one of the important principles of didactics. They are necessary for students to understand the relationships that exist between objects and phenomena in objective reality. Their relationship is necessary because each of the subjects helps to improve the other, and the methods and techniques of cognitive work is used in the study of one subject are transferred to another. Foreign language (English) being the subject of study, at the same time, is an important means of communication and knowledge. This feature of the language opens up wide opportunities for communication with various subjects of the curriculum: texts in a foreign language can become a source of new and valuable information in the field of science. For instance, in the process of learning a foreign language, students can gain knowledge about chemical phenomena in nature, famous scientists who have worked and are working in various fields of knowledge, properties of substances, etc. To study a foreign language without the connection of various subjects means to underestimate its educational value, to narrow the scope of the practical application of language, skills and not to fully implement interdisciplinary connections as a principle of didactics. However, the practical implementation of English in the present and future of a modern person is important from many attitudes-this is the ability to conduct a conversation, read popular science and scientific literature on subject of the natural science cycle, for example in chemistry, physics etc. [1]

Nowadays, many lectures and learning resources, such as textbooks or the internet, use English as the medium of instruction. Experience has shown that both the aspects of the language and the content (subject) can be effectively integrated into learning.[2-5] It is also can create a synergistic impact that means that students who like the language will remain motivated to learn even if

they do not like the content, and vice versa. Students who are very fond of content (subject) will still get the language skills. Also, learning has a positive impact on improving academic language. Science learning, especially chemistry, using English as the medium of instruction has challenges and obstacles. [6-7] English skills become a factor to be aware of. However, good English mastery does not necessarily give good results in understanding the concept of chemistry and vice versa. The language used in science is usually different from everyday languages. [8]

The method of learning chemistry using English is undoubtedly different from learning chemistry with the local language. Some studies have claimed that there are have claimed that there are two acquisitions content and language.[9-10] Besides, the use of textbooks in this learning becomes an essential factor. Not all English speaking textbooks can be easily understood and learned by students. [11] Moreover, Vithanapathirana & Nettikumara (2020) explained the difficulty in finding learning resources in bilingual schools. Therefore, it is necessary to select textbooks and learning methods suitable for teachers and students in learning.[12]

Learning science in English that has many positive impacts is the demands of individual school with international school characterization. However, in the teaching-learning activity, it was found that the students feel guilty in understanding the concept of chemistry while using English as the medium of instruction. Students have difficulty in understanding the scientific language of chemistry and abstract concepts described in English. Also, the teaching materials used have not been able to accommodate students' needs both in terms of teaching materials and the exercises on the learning materials. These findings are rarely discussed and evaluated in Indonesia's journal articles, whereas learning in bilingual school is essential.

The obstacles in learning science using foreign language are found in various countries as well. For example, Albakri (2013) stated that students face some obstacles in understanding science texts using English in a high school in Dubai where their native language is Arabic. [14] Unlike the research of Albakri, Ruiz de Zarobe & Zenots (2017) study at a school in the Spanish Autonomous Community concluded that learning using the global language could improve concepts as speaking skills, especially in student's reading skills. [15]

Analysis that has been done from various research findings on science learning in English increasingly strengthens that the impact caused is very diverse. The obstacles encountered are very diverse, as well. Therefore, it is also necessary to study through research about the implementation of science learning, especially chemistry, that uses English as the medium of instruction. It has been explained that learning science in a global language is a demand in today's globalization era. Therefore, the analysis of ongoing learning must be undertaken to determine the success of the learning. It is also important, that the formation of practical language skills requires the active interaction of a English language teacher and subject teachers. It should begin with the preparation of a related calendar –thematic plan, where the selection of theoretical material is carried out for the formation of educational practical skills of students, as well as detailed guidelines on the organization of the teaching itself.

At the same time, not only general didactic, but also particular didactic principles of teaching should be taken into account, allowing the development of certain tasks using such teaching methods as explanatory and illustrative, reproductive, partially exploratory and research. It should be noted that the presented lexical materials must be studied by translating both from native language into the studied foreign language. It is also necessary to make a selection of lexical materials established by the programs of teaching various subjects.

In this way interdisciplinary connection between English language and the natural science subjects cycle is of fundamental importance for pedagogy and methods of teaching subjects. It provides interaction of points between subjects that serve the harmonious development of their thinking.

At present, such connection is relevant, it reflects not only the interdisciplinary nature of education, but also erases the inter language barrier in the field of engineering, production technology and in a practical human activities.

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## TEACHING MULTILINGUALISM: LEARNING STRATEGIES

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The standards for the process of teaching foreign languages are changing as a result of the implementation of the Bologna Agreements. Today's foreign language teacher must not only give pupils with information, abilities, and form skills, but also help them build the capacity to independently study a foreign language and culture. It is very important to consider the construction and growth of students' independent educational competency, as well as acceptable methods of gaining knowledge and creating skills. The development of a student's ability to engage in independent educational and cognitive activity is dependent on the use of educational strategies. This essay investigates the qualities of a successful learner and argues for the importance of teaching strategies for acquiring a foreign language.

The same strategies are employed while learning a second foreign language as when learning the first, yet each has its own uniqueness. The deployment of any educational and cognitive procedures is distinguished by their awareness.

The distinctiveness of strategies for acquiring second and subsequent foreign languages is dictated by students' educational and linguistic background, as well as their age. The purpose of this article is to investigate the methods required for the development of the phonetic side of speech.

**Keywords:** multilingualism, educational autonomy, educational strategies, successful language learner, phonetic side of speech.

The ability to process large amounts of information quickly and efficiently is a time requirement and depends on the formation of the student's learning strategies. In relation to the acquisition of a foreign language, strategies are "combinations of intellectual techniques and efforts that are used by students to understand, memorize and use knowledge about the language system and speech skills and abilities; cognitive operations that are selected by students from among the possible ones to solve a communicative task." (Azimov E. G., Shchukin A. N., 2009)

In order to find out the reasons for success in mastering a foreign language, a "successful learner" and his or her learning behavior were characterized. H. Stern and J. Rubin distinguish the following characteristics of a "successful student": 1) lack of fear of making a mistake; 2) search for formal patterns and schemes; 3) experiments on the way to the goal; 4) attention to meaning; 5) readiness for exercise; 6) readiness to participate in real communication; 7) self-observation. H. Stern, in addition, names three more signs mentioned J. Rubin has implicitly: 8) discovering your own style in teaching; 9) active position and responsibility; 10) gradual development of the target language system independent of the native language.

The use of certain strategies depends on each individual, on his cognitive style. There are visual, auditory, communicative, motor, practice-oriented, abstract-analytical types. There are other classifications of learning styles, among which, in relation to the process of teaching a foreign language, one can note such cognitive styles as "utility-dependent – field-independent" (a tendency to global or analytical comprehension

of reality), "reflexive - impulsive" (a way of making decisions in complex problem tasks), etc. Already at school age, students know how they better understand, memorize, and assimilate the material. However, even students are not always aware of their individual cognitive style, its advantages and disadvantages, and the fact that the strategies they use depend on the cognitive style. By introducing students to new techniques, expanding their strategic repertoire, the teacher gives them the opportunity to choose for themselves more suitable and effective ways of teaching.

The necessity and importance of teaching students effective language acquisition strategies is based on the following provisions:

- mentally active students are more successful in learning: students who consciously organize and integrate new information into information already stored in the memory have more cognitive connections that support understanding and reproduction than those whose learning activity consists in memorizing;
- strategies can be learned. Students who know strategies and have the ability to apply them are more successful;
- learning strategies can be extended and transferred to other activities;
- learning foreign languages in academic conditions with the help of educational strategies will be more effective, since it has a lot in common with solving a problem situation in the native language.

The learned strategies can be transferred to the process of mastering a new foreign language (Rampillon, U., 2003):

- "smart guessing": assumes knowledge about the world, about the target language, about the context,

about interlanguage knowledge (the influence of native and foreign languages);

- hypothesis testing: 1) perception of the problem; 2) reflection; 3) hypothesis formulation; 4) hypothesis formulation; 5) hypothesis testing;

- integration of new knowledge into existing knowledge;

- parallel use of various sources of information and educational materials;

- mnemonic strategies for memorization;

- the use of words of native and learned foreign languages;

- word conversion of familiar languages;

- perception and use of kinship of languages;

- application of metalanguage terminology, etc.

The use of strategies should be done consciously.

It is also necessary to inform students that educational strategies are applicable to the study of any foreign language, regardless of whether it is the first, second or third foreign language for students.

However, in order to use strategies when mastering a new language, it is necessary to master the minimum profile of strategies at the stage of mastering the first foreign language.

There are many classifications of strategies. The most famous classification of strategies belongs to R. Oxford, and includes the following strategies:

- direct strategies for learning a foreign language (mnemonic strategies, cognitive strategies, compensatory strategies);

- indirect strategies for learning a foreign language (metacognitive strategies, affective learning strategies, social strategies).

J. M. O'Malley and A. U. Chamot subdivide strategies into cognitive, metacognitive and socioaffective, thereby increasing the number of strategy groups compared to the previous classification (1990).

According to S. I. Lebedinsky and L. F. Herbig, an extensive classification containing two large groups of strategies (2011):

- 1) foreign language acquisition strategies (metacognitive, cognitive, socio-affective and pragmatic, communicative strategies);

- 2) strategies for using a foreign language.

Focusing on the strategies necessary for the development of the phonetic side of speech, we use the classifications presented above and consider three groups of strategies for teaching phonetics, namely metacognitive, cognitive and socio-affective strategies.

Metacognitive strategies are important for independent work. They are focused on awareness of what the learner is doing, what strategies he uses, as well as knowledge of the process of language acquisition and its individual links, including awareness of the ultimate goal of language learning in terms of achieving a certain level of speech development for students.

Metacognitive strategies for mastering the phonetic aspect of speech include the following:

- setting and achieving a goal;

- correlation of the goal with the results achieved;

- identification and discussion with the teacher of the most effective learning strategies and techniques;

- maintaining a positive attitude to the process of mastering the pronunciation side of speech;

- pronunciation assessment.

Cognitive strategies involve interaction with the studied material, manipulation of it, the use of special techniques, techniques for learning (Shchepilova A.V., 2005).

The following actions can be distinguished as cognitive strategies involving memorization and manipulation of the structures of the language being studied:

- recognize and repeat the stress in a word;

- recognize and repeat intonation;

- focus on the pronunciation of perceived speech (listening texts);

- record and listen to your voice;

- *establish analogies and formulate rules for understanding the relationship between sounds and letters;*

- *to identify the contrast between the phonetic phenomena of the studied language and the native / learned languages;*

- imitate the pronunciation / intonation of native speakers;

- memorize interesting oral texts (songs, poems, tongue twisters, etc.) and repeat them aloud or to yourself;

- humming lyrics, imitating intonation;

- associate words by phonetic similarity;

- use the sound in oral speech, using the words containing this sound.

Italicized strategies become the most relevant when mastering the second and subsequent foreign languages.

Socioaffective strategies involve interaction with other students, emotional involvement in the learning process. They are associated with collective learning activities, with obtaining information from native speakers, with the creation of an educational algorithm of action for the teacher, taking into account the capabilities and psychological characteristics of the student (Serebrantseva O.G., 2006). These include actions such as:

- watch movies and TV programs with subtitles;

- use the means of communication available to the student that contain audio information, such as the Internet, television, radio, video, CD-ROM;

- use the means of communication available to the student, providing oral interaction, such as telephone, videoconferences, voice chat, etc

It should be noted that the strategies to be learned must be repeatedly presented to students, commented on, compared, evaluated. The use of strategies may have different degrees of independence.

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# PHILOLOGICAL SCIENCES

## IMPACT OF DISCOURSE ON INTERCULTURAL COMMUNICATION

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### Abstract

Being one of branches of Linguistics, discourse is widely searched field that demonstrates great influence on the communication. Communication covers the entire elements of interaction between people in the world, coding and decoding of transformed information. The concept of conversation to range each type of communication is reflexed in discourse. Moreover, with the purpose of developing the intercultural communication world nations are consulted to focus on the gist, essence, emphases of the text, whereas they produce the knowledge and intelligence in front of the particular audience. Due to the previous mentioned data, we are able to realize an effective intercultural communication which reflexes all covered discourse.

**Keywords:** intercultural communication; linguistic; ethnography; philosophy; historical analysis

Discourse is a broadening of the concept of conversation to encompass all forms of communication. Discourse is a major topic in social theory, with work spanning disciplines such as sociology, anthropology, continental philosophy, and discourse analysis. Following the pioneering work of Michel Foucault, these fields regard discourse as a system of thought, knowledge, or communication that constructs our experience of the world. Because control of discourse equates to control of how the world is perceived, social theory frequently studies discourse as a window into power. Within theoretical linguistics, discourse is defined more narrowly as linguistic information exchange, which was one of the major motivations for the framework of dynamic semantics, in which expressions' denotations are equated with their ability to update a discourse context.

Discourse is a formal way of thinking that can be expressed through language in the general humanities and social sciences. Discourse is a social boundary that defines what statements about a topic can be made. Many definitions of discourse are heavily influenced by the work of French philosopher Michel Foucault. Discourse is defined in sociology as "any practice (found in a variety of forms) by which individuals imbue reality with meaning."

Political science considers discourse to be inextricably linked to politics and policymaking. Similarly, various theories from various disciplines see discourse as linked to power and state, insofar as control of discourses is viewed as a hold on reality itself (e.g. if a state controls the media, they control the "truth"). In essence, discourse is unavoidable because any use of language influences individual perspectives. In other words, the chosen discourse provides the vocabulary, expressions, and, possibly, even the communication style required. For example, two distinct discourses can be used to describe various guerrilla movements, referring to them as "freedom fighters" or "terrorists."

Discourse is a conceptual generalization of conversation within each modality and context of communication in discourse analysis. The term is studied in this sense in corpus linguistics, which is the study of

language expressed in corpora (samples) of "real world" text.

Furthermore, because discourse is a body of text intended to communicate specific data, information, and knowledge, there are internal and external relations in the content of a given discourse. As a result, discourse does not exist in and of itself, but is linked to other discourses through inter-discursive practices.

In Francois Rastier's semantics approach, discourse is defined as the totality of codified language (i.e., vocabulary) used in a given field of intellectual inquiry and social practice, such as legal discourse, medical discourse, religious discourse, and so on. In this sense, as with Foucault's in the previous section, discourse analysis examines and determines the connections between language, structure, and agency.

Intercultural communication and education discourses Intercultural communication research is characterized by significant theoretical and methodological heterogeneity, which is not surprising given the topic's 'broadness' or 'fuzziness.' Despite these differences, it appears that 'phenomena of cultural differences [are] "somehow" meaningful for the communication process. It is assumed that communication is inextricably linked to cultural presuppositions, values, and identities, which can lead to misunderstandings, stereotypes, and prejudices. One of the primary goals of intercultural education is to overcome the ills of ethnocentrism in particular—the belief that one's norms, values, and ways of being, acting, and relating are universally valid and superior to those of others.

One of the most important ways to accomplish this is to increase knowledge about other perspectives and raise awareness about similarities and differences among people who do not, or only partially, share a common socio-cultural and linguistic background. Openness, flexibility, tolerance, and empathy are essential goals, as are self-reflection and, ultimately, the relativization of taken-for-granted assumptions. However, this is the extent of our shared experience. A closer look at individual approaches reveals the diversity of, and tensions between, theoretical stances on the

nature of intercultural communication and concomitant recommendations for intercultural education.

The current chapter begins with the assumption that academic discourses about intercultural education actively co-construct rather than discover, describe, and analyze intercultural communicative practices that already exist objectively. Academic authors, as well as teachers, consultants, and trainers, have a significant impact on intercultural interaction ideas and practices by providing cognitive and discursive resources for thinking about, relating to, and communicating with others. Taking this discursive mediation of social scientific knowledge as a starting point, intercultural education discourses are understood to be interpretive and evaluative moments that necessitate increased reflexivity toward the role of language in the formation of reality and the construction of knowledge: ... We should be concerned not only about intercultural communication in general, but also about how it is perceived.

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## VICTORIAN ENGLAND AND CHARLOTTE BRONTE'S NOVEL JANE EYRE

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### Abstract

Charlotte Bronte's "Jane Eyre" can be called a real attraction of the Victorian era and the public position of that time. The novel assesses the role of women in the family and society, and emphasizes the importance of a woman's search for her true identity. The plot of the novel is in the form of Bildungsroman (a novel about the development of a person from the past to the present), which reflects the development of the protagonist from adolescence to adulthood. This chronological structure brings together the feelings and experiences of the character that help to create and shape his personality in the novel. In the book, the author divides Jane's life from adolescence to adulthood into five important stages. It is at these stages that Jane's experiences enable her to grow as a real person, and therefore the novel is narrated retrospectively (remembering the past). Charlotte Bronte was the first to publish her novel under the pseudonym Carrer Bell, to hide her identity from the public and critics. In Victorian times, the idea that it was published by a female author, in addition to being the author of such a controversial novel, was considered a public condemnation because women were considered a subject. The women of this period were considered to be faithful women who dedicated their lives only to their home, family and, most importantly, to their husbands. She obeyed both her worldly and heavenly masters and understood her place in the sexual hierarchy. But Charlotte Bronte created Jane Eyre to prove to the society of her time that it was unorthodox, that is, the opposite of what was believed to be true. Jane Eyre criticizes the essence of the hierarchy of the serious social class in England in Victorian times. The novel class emphasizes the importance of consciousness and the subjectivity that a particular class may face at the hands of religious elites. Criticism of the orthodox attitude towards women, the degrading treatment of orphans and orphaned children, and the bitter consequences of the superiority of oppression and class stratification over people are important in determining the place of such a work in English literature.

**Keywords:** writer, Victorian era, Charlotte Bronte, Victorian convention, classical literature, Jane Eyre, social status, inner desires, realist inner struggle

### Introduction

Almost no other period in British history has brought as much social, economic and political change as the Victorian era. It has long been a tradition to classify British history according to certain time periods and periods named after their current heads of state. Thus, after the accession of Princess Alexandra Victoria of Kent, later known as the Queen, to the throne in 1837, the period when she was in power was

also named after the prince. Her reign lasted until her death in 1901, marking the end of the Victorian era. Victorian society witnessed many innovations, and this period was very different from the previous one.

To give a realistic picture of Victorian society, it is important to note some of the reforms and acts implemented by the government in the 19th century. For example, with the adoption of the Great Reform Act of 1832 (three of which were during the reign of



Queen Victoria), the right to vote was granted to a large part of the population. In the last years of the Victorian era, only 12 percent of the population was still allowed to vote legally. In fact, women's freedom was severely restricted at the time, leaving them almost entirely dependent on male leaders (fathers, brothers, husbands). This custom, known as the "veil," was virtually abolished in 1882 by the Married Women's Property Act. In addition, Victorians (mostly those suffering from poverty) suffered under the Poor Law Act of 1834. They were to be housed in workplaces and similar establishments known for their deplorable conditions, which are widely presented and criticized in Charles Dickens' novels. One of the progressive achievements of the Victorian era was the abolition of slavery in 1833 under William Wilberforce, who freed thousands of colonial slaves. (6) The empire's economy underwent a great transition from an agricultural policy to, as Sin Porche put it, "an urban and industrial society based on a culture of growing individualism and capitalism." Britain was evolving and consciously moving towards a new modern era. Manufacturers, industrialists, and entrepreneurs were encouraged by the new capitalist spirit, they sought to make a profit, and thus gradually gained power, influence, and basic status. At this time, a middle class emerged, consisting mostly of such merchant families. Technological advances, such as the construction of a steam-powered railway, led to an industrial revolution that spread throughout the United Kingdom. In 1851, Prince Albert himself supported scientific discoveries by showcasing Britain's scientific and technological achievements at a major exhibition attended by more than 6 million visitors. A new interest in science has resulted in the reorganization of Victorian morality. The best example of this is Charles Darwin's Theory of Evolution, which called into question the long-standing doctrines of the Church in Victorian times. Thus, it can be said that the Victorian period in 1901 was a period of great prosperity, which manifested itself in a large population growth of 30 million. Well-known historian Walter Besant summed up his progressive generation as follows: It seems to us that this period seems to be a great triumph for those who find it difficult to look at events from the outside in their proportions. But we need to know that change is nothing but transformation. And no one regrets the change. During this long period, with the exception of the reign of Queen Elizabeth, a spirit of initiative, effort and achievement, unique in our history, has emerged in the national consciousness. People were still worried as they were then: this concern was manifested in all kinds of changes, in every field - in colonialism, emigration, research, discovery, invention.

The economic turmoil of the Victorian era had a direct and fundamental impact on the moral and spiritual values of the people. The high welfare of a large proportion of the British population, as well as the Education Act of 1870, made education compulsory, so that better educated Victorians (especially the more affluent middle class) turned their attention to more ethical issues. Social evils, morality, moral issues and the gender problem in society were reconsidered. Thus,

at that time, various forms of critical writing appeared in literature, speeches, art and other fields. Michael Paterson described this development as follows: During the sixty-four years of Victorian rule between 1837 and 1901, the British became more gentle, more generous, and more civilized than their rude ancestors. Executions were stopped in public and whipping was abolished. Victorians not only did not accept the behavior and ideas of their ancestors, but also hated their moral weakness and weakness. everything that seemed small.

From the above mentioned, it can be concluded that Victorian society has gone through a certain "stage of development" in its education system in the first place. As a result of this development, an authoritative middle class emerged, trying to keep pace with the existing intelligence and determine its status. Art and literature were the main attractions of the people of that time, and the growing interest in art, especially literature, was obvious. This interest and need for literature led to the creation of countless articles, magazines and novels, and this process was welcomed by the people. The increase in the number of published works due to the discovery of new printing methods and the reduction of the material value of books also led to the popularity of reading. As the period progressed, reading began to be practiced for the first time as a leisure activity, not for intellectual purposes for learning and self-improvement. Small "pocket editions" of great literary works could be carried everywhere. The railway increased the demand for books, and the long journeys by train were an opportunity to read. Train stations were now bookstores where people could buy prose, poetry, and publications of their choice. Special book publications, such as the Railway Library, were intended primarily for train passengers. In addition, libraries were built everywhere, and the London Library (founded by Thomas Carlyle), built in 1841, is the best example of this. Such a great interest in reading and the growing number of readers led to the emergence of more writers and poets. In the nineteenth century, authors such as Charles Dickens, Thomas Hardy, Anthony Trollope, George Eliot, and, of course, the Bronte sisters emerged. Compared to the romantic period in which the genre of poetry was of great interest and popularity, readers in the Victorian Society were more interested in prose, or more precisely, novels. There are several points to explain why novels became popular among Victorians, but an acquaintance with the novels of the time reveals that all of these points share a certain component: First, the Victorian novel reflects the ever-present social and economic changes that society must undergo. No other genre of literature, other than the prose genre, has been able to reflect the extreme complexity of the sociological and economic changes of the Victorian era so fully, in detail and in depth. Because this genre was a longer form of literature than the others, which allowed the author to present a fairly detailed description of the changes of his time. Moreover, the novels reflected the issue of social existence in the 19th century. In their writings, the writers of that time often exposed social evils,

conveyed to people the negativity of a rapidly changing society, and expressed their desire not to go astray and return them to their former morals. While some of the novels written at the time reflected the deplorable, intolerable conditions of the working class, others drew readers' attention to, for example, pre-feminist and feminist themes, women's issues, and so on. directed. These topics led to extensive discussions about the place and position of women in society. Moreover, the Victorian novels clearly showed how capitalism turned the middle class into the most influential class of the period. The middle class was primarily interested in the publication and reading of literature, so these topics reflected the middle class's view of society. Since the Victorian era lasted more than 60 years, it is generally impossible to characterize a "typical" Victorian novel, but it should be noted that many of these works also reflect the literary genre of realism.

But strangely enough, Ch. Bronte's previous novel, *Jane Eyre*, is full of romantic elements and melodrama. How can this be explained? Critic Margaret Ann Dudi noted that the critical experience of the nineteenth century and its literary history focused on realism, while many writers wrote more novels, fantasies, and so on, provided they remained true to tradition. Although Charlotte Bronte appears to have been heavily influenced by realism, she did not limit her work to this style, often combining elements of both realism and romance in her work. His novel *Jane Eyre* is clearly a romantic work and does not reflect the "reality" of the Victorian era, its main themes are status, the problem of gender discrimination and social inequality in religion.(2) Charlotte Bronte's *Jane Eyre*, one of Victoria's most famous novels, provides insights into the period and its society. With the help of this novel, it is possible to explore the changes and developments in Victorian England in an artistic way. Charlotte Bronte's work can also be considered a novel written in a historical context. Examining *Jane Eyre*'s rebellion, we see that her critique of the then accepted gender roles and her liberal idea of femininity point to a strong female emancipation. Jane's demand for gender equality becomes clear through the interpretation of certain passages. An in-depth and comprehensive analysis of the image of *Jane Eyre* reflects the morals of Victorian society, as well as the views and opinions of people living in that society about religion. The most important Christian conventions are represented by symbols that correspond to different interpretations of Christianity. The cruelty of religion and faith at the time contradicted Jane's idea of a good and loving God.

This famous novel by Charlotte Bronte is truly unique. In this novel, the author tries to show all the ugliness of the Victorian era by describing a young woman who spoke out against the injustices and ill-treatment of the simple and lonely in various spheres of life. As is well known, Queen Victoria's reign was a period of change and innovation. The Victorian era witnessed a major boost in its economy, as well as changes in its social structure, and the industrial revolution stimulated globalization as well as modern science. Later, pre-feminism emerged with criticism of

the then-accepted gender reform. Christianity has also been reconsidered and liberalized.

The concepts of gender and religion are among the most important conditions that shape Victorian society. An analysis of some of the characters in *Jane Eyre* from this point of view, and some literary research, reveal how difficult and unbearable it is to live in Victoria England, and why this period has been so rebellious and reformed.

While writing the first chapter of *Shirley*, published in 1849, Charlotte Bronte herself expressed a desire to portray realism in her work. "Reader, if you think from this preface that everything like romance was created for you or prepared for you, you have never been so wrong. Can you understand feelings, poems and dreams? Expect passion, stimulus and melodrama? Set aside your expectations. In front of you is a simple and magnificent work that reflects reality. Something not as romantic as an ordinary Monday morning, just like when everyone wakes up with the thought that they should get up and go there. It may not be positive that you don't taste an interesting dish in the middle of a meal or during a meal, but it was decided that the first meal on the table would be a Catholic meal or even an Anglo-Catholic meal that you could eat on a good Friday, including cold lentils and lean vinegar. There will be unleavened bread, not lamb." (3) After its publication in 1847, *Jane Eyre* received immediate positive reviews. Charlotte published her novel under the pseudonym Carrer Bell to hide her gender due to the persecution of female artists. Thus, her work could be read quite seriously. The answers became harsher after she openly admitted that he was the author of *Jane Eyre*. Wanting to learn a professional opinion, Charlotte wrote to the poet, laureate Robert Southey, and asked him what he thought of *Jane Eyre*. In Sauten's response, the writer was sharply criticized: "Writing should be a hobby for a woman, writing should not be a career for a woman." (7) Such attitudes and oppression of women are the main reasons for Charlotte's criticism and rebellion against *Jane Eyre*. Its constant demands are gender equality, social equality and freedom. Jane's relationship with her master, Mr. Rochester, and her passionate nature and free expression of ideas were in stark contrast to the idea of femininity in Victorian England.

Charlotte Bronte's first novel, *Jane Eyre*, is about a young coach and her struggle for freedom. In this work, the author acquaints her readers with the social situation in England in the early years of the Victorian era. The work can be classified as "bildungsroman". In the Oxford Dictionary, the word "bildungsroman" is defined as "a novel about a person's years of maturity and formation or spiritual education." (8) *Jane Eyre* is a Gothic novel by Charlotte Bronte, published in 1847. In fact, Charlotte and Jane share several similarities. One notable difference is that Charlotte Bronte did not inherit large sums of money.

Although she was severely criticized by writers and poets of the time for his early writings at the age of twenty, with the support and encouragement of her four sisters, Charlotte opposed the Victorian Convention and became a successful author whose books are now

considered classics. Jane Eyre revolutionized the world of science fiction at the time, as she openly discussed Victoria's realistic inner struggles with both her social status and her inner desires.

### Conclusion

The novel "Jane Eyre" is a novel that has a special place in the literature of the nineteenth century in bringing the social characteristics of the Victorian period to the literature, a work that reflects the artistic manifestation of all these features. The paper examines the characteristics of the leading literary genres of the Victorian era, the revolt against oppression in the novel, and the historical and social causes of this revolt. As a result, in order to solve the problems of humanism of the Victorian era in the novel "Jane Eyre", the problems of class discrimination, humiliation and humiliation of people in society at that time were exposed and social deformities were revealed through a young girl with no class.

As a result of the study, it becomes clear that it was the nineteenth-century Victorian era that created the fertile ground for the emergence and writing of the novel Jane Eyre. The study notes that the main shortcoming of society is the discrimination between the poor and the poor, which is observed throughout the novel. It is not clear from the analysis of the characters in the work and their actions that neither class stratification nor the existing state will help people in a bad day.

It is clear that rapid development, industrialization, or material wealth in a society cannot

be the savior of man in difficult times. It is shown that the main wealth that is valuable for a person in the world is human qualities and humanism.

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## THE INTERSECTION OF THE SPHERES "PAST", "PRESENT" AND "FUTURE" IN THE SEMANTICS OF TEMPORARY ADJECTIVES

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## ПЕРЕСЕЧЕНИЕ СФЕР "ПРОШЛОЕ", "НАСТОЯЩЕЕ" И "БУДУЩЕЕ" В СЕМАНТИКЕ ВРЕМЕННЫХ ПРИЛАГАТЕЛЬНЫХ

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### Abstract

The article elaborates the bonds between the concept of time and concepts of space and movement. Temporal relations between the phenomena have been demonstrated in the language with spatial relations. The article underlines that time also moves like other notions. It has been noted that the concepts of "past", "present" and "future", as natural categories, are open spaces which do not have clearly fixed boundaries. Objects, phenomena, events, etc., related to the past, present or future, receive both positive and negative assessments in the minds of modern English speakers.

### Аннотация

В статье раскрываются связи между понятием времени и понятиями пространства и движения. Временные отношения между явлениями были продемонстрированы в языке с пространственными отношениями. В статье подчеркивается, что время также движется, как и другие понятия. Отмечено, что понятия «прошлое», «настоящее» и «будущее», как естественные категории, представляют собой открытые пространства, не имеющие четко установленных границ. Предметы, явления, события и т. д., относящиеся к

прошлому, настоящему или будущему, получают как положительные, так и отрицательные оценки в сознании современных носителей английского языка.

**Keywords:** phenomena, spatial, place, quantity, past, present, future, temporal

**Ключевые слова:** явления, пространство, место, количество, прошлое, настоящее, будущее, временное

The most obvious and universal are the connections of the concept of time with the concepts of space and movement which are also related to spatial and "motor" metaphors of time. Spatial metaphor of time in many languages, temporal orientation can be described using units with the semantics of spatial orientation. This phenomenon seems quite natural, since the general trend in the development of linguistic meanings, associative transfers is the movement from a more concrete, perceptually perceived to a more abstract and in general can be represented as follows: (quality, place) - (quantity, time) - (logical relations, modality, intensity, evaluation, expressiveness) [2, p.38].

Temporal relations between events and phenomena are represented in the language by analogy with spatial relations (on the table - on Monday, in the box - in a week; in front of the house - before the meeting, across the river - every other day, etc.). The distance between two "moments" of time is likened to the distance between two points in space - a straight line. Time gets a sign of linearity. Thus, through the spatial metaphor of time, a linear model of time is born. In this case, the line (axis) of time can be either horizontal (afar corner of the trailer - the far past; distant shore - in the distant future, etc.), and vertical (cf. deep water - to read deep into the night; deep lake - deep old age, deep autumn; in Latin superior - "previous", letters, "upper", a inferior - "later", letters, "lower").

A similar idea of the development of ideas about the world according to the "concrete temporal abstract" scheme was expressed by Heim [4, p.30]. According to many authors, confirmation of the deductibility of temporal relations from spatial representations is, among other things, the fact that for a very long time the child, representing time, operates with spatial relations, i.e. in ontogeny the sense of space develops before the sense of time [4, p.32]. However, it is necessary to emphasize the possibility of developing metaphorical transfers in the opposite direction, which is a manifestation of the direct interconnection of various areas of human experience.

Interesting data on the continuity of space and time in the archaic model of the world of the ancient Germans are given in the study of Dowty David, is dedicated to-Length as a spatial parameter becomes longitude / duration - a temporal parameter. Long / short are represented as taking a long or short segment on the time line (and short stick - a short stay, a long way - a long talk, a long drink, etc.).

It must be emphasized that time, space and movement form a kind of syncretic whole. The idea of such unity was reflected in the concept of the chronotope developed by M.M. Bakhtin and actively used in the linguistic literature at the present time. Space and time are interpreted in this concept as different aspects of a synthetic whole space-time [5, p.22]. Space and time are

connected by the idea of movement, which is the third component included in the concept of chronotope. The synthesis of the semantics of these three categories is ontologically conditioned. A common property of space and time is extension. The movement is aimed at overcoming a space of a certain length, and the longer this length, the more time is needed to overcome it (cf. a long ride, a long walk through the park, a long sea voyage, etc.).

Time, like objects, moves (cf. The time flies; Time flies / runs, etc.). On the one hand, time, like objects moving in space, can move rectilinearly, unidirectionally and irreversibly (Time will pass, you will not return it). On the other hand, a person perceives the repetition of cycles of movement of natural objects (sun, moon, stars), as well as the duration of these cycles. The idea of time as a constant repetition of natural and "life" circles (What was, will be repeated again) underlies the cyclic model of time.

Ideas about time as a cycle or as a line are among the basic images associated with the concept of time Hinrichs, E, especially emphasizes that "the concepts of "Cyclic time" and "Linear time" dominate over the entire set of particular concepts of time" [3, p.62]. The cyclic model of time is the idea of time as movement, rotation in a circle, as a sequence of the same type, recurring events, "circles of life". This perception of time is associated with cosmological consciousness, human observations of natural (solar, lunar, vegetative) cycles.

The concepts of "past", "present" and "future", being natural categories, are open spaces that do not have clearly fixed boundaries. The factor that determines their scope in each particular case is the person who perceives and / or describes events, phenomena, states, etc. [1, p.39] Therefore, when describing the semantics of the past, present, future, the concept of "focal interval" is important, which is defined as an interval of time that is actualized in the mind of the observer / speaker, in which the most important events for him are grouped, that is, on which his attention is directly focused.

2. The scale of the time interval with which the observer / speaker associates himself may vary. It can be micro-T (current time), midi-T (actual time) or macro-T (background time). The functioning of adjectives with the referential sphere of the past, present and future in speech confirms the "different interval" nature of these concepts.

3. The blurring of the boundaries of the past, present and future is manifested not only in the possibility of their perception on different scales. An analysis of the functioning of the adjectives of the temporal triad showed that units whose profiling function is the expression of the semantics of past experience are able to participate in modeling the area of the actual present, and adjectives with the nuclear semantics of the present

tense can have signs of past experience. This, at first glance, illogicality of linguistic functioning is only a reflection of the complex perception of time by the human mind, which cannot always clearly distinguish between fragments of the surrounding reality. After all, if for a person "Time present and time past are both present in time future, and time future contained in time past" ("Present time and past time are both present in future time, and future time is contained in past time"), how then to separate the boundaries of the sphere of semantics of the past from the present and future, and the present from the past and future? The spheres of the past, present and future, touching, form the border areas

of the near (recent) past and near (near, immediate) future. There are units for which such boundary temporal semantics are nuclear, for example, recent, new, coming, etc.

4. The semantics of the past, present and future is closely related to the scope of evaluation. Objects, phenomena, events, etc., related to the past, present or future, receive both positive and negative assessments in the minds of modern English speakers. In the semantics of most adjectives of the tense triad, there are qualitative and evaluative features. These features have different status in the semantics of the units under consideration. By this parameter, they can be divided into three main groups (Fig.1):

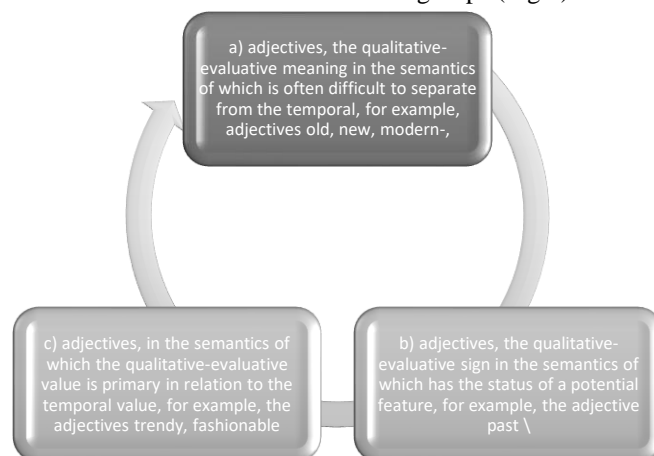


Figure 1. Features of semantics

5. As a result of observing the use of adjectives of the temporal triad, the following main functions were identified (Fig.2):

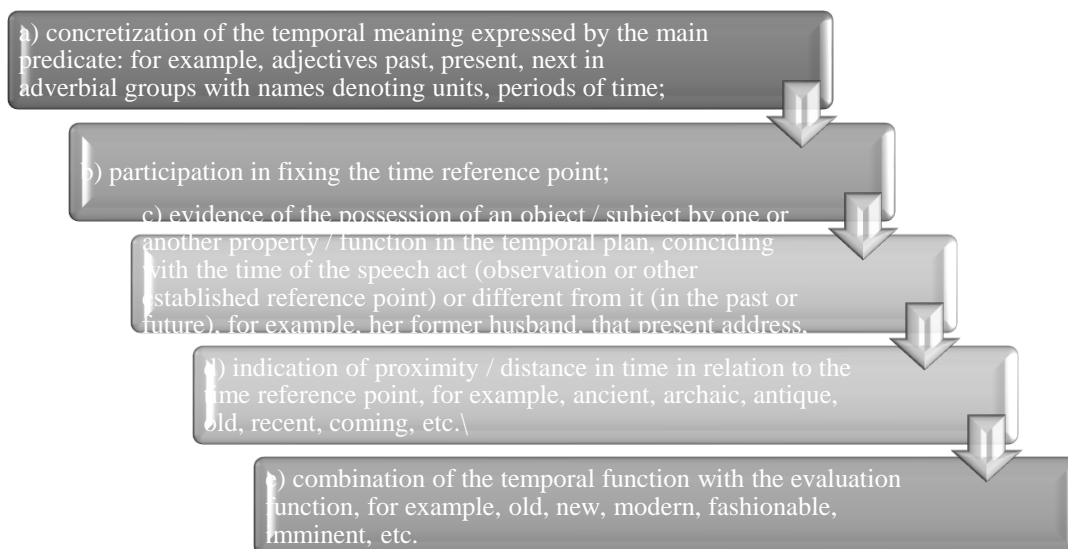


Figure 2. Functions of temporal triad

6. Lexical indicators of time, which include temporal adjectives, are traditionally evaluated as part of the periphery of the temporality field in general and the "past / present / future" microfield in particular. However, the peripheral position of temporal adjectives in the field of temporality does not mean that these linguistic units are not essential for expressing temporal relations. Thus, most of the adjectives under consideration in the vast majority of cases succinctly convey

meanings that can otherwise be expressed only by compound phrases or expanded subordinate clauses.

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## GENERAL COGNITIVE OVERVIEW TO THE CATEGORY OF AFFIRMATION

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## ОБЩИЙ КОГНИТИВНЫЙ ОБЗОР КАТЕГОРИИ УТВЕРЖДЕНИЯ

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### Abstract

The article discusses the category of affirmation which is at the focus of cognitive linguistics, one of the modern fields of linguistics. The article emphasizes that the main task of cognitive language is to be able to learn within real language activities. The most common mood of all languages in the world is affirmation. The article discusses in detail the affirmations expressed by paralinguistic expressions and perceived by denials. The relationship between the theory of self-affirmation in psychology and affirmation in grammar is also discussed. Since affirmation is based on excessive subjective judgments, it is emphasized that modality is also an important means of expression. The article discusses the relation between litotes, metacognitive negation and affirmation, as well as the ability of conjunctions, and adverbs to reinforce affirmations.

### Аннотация

В статье рассматривается категория утверждения, которая находится в центре внимания когнитивной лингвистики, одного из современных направлений языкознания. В статье подчеркивается, что основная задача когнитивного языка состоит в том, чтобы иметь возможность учиться в рамках реальной языковой деятельности. Все языки мира являются утверждениями. В статье подробно рассматриваются утверждения, выраженные паралингвистическими выражениями и воспринятые отрицаниями. Также обсуждается связь между теорией самоутверждения в психологии и утверждением в грамматике. Поскольку утверждение основано на чрезмерно субъективных суждениях, подчеркивается, что модальность также является важным средством выражения. В статье рассматривается соотношение между литотами, метакогнитивным отрицанием и утверждением, а также способность союзов и наречий усиливать утверждения.

**Keywords:** affirmation, denial, cognitive linguistics, approach, meta-cognitive negation, semantics

**Ключевые слова:** утверждение, отрицание, когнитивная лингвистика, подход, метакогнитивное отрицание, семантика.

Cognitive linguistics, which studies the formation of language and the interrelationships of basic mental operations related to language, understands language as an enterprise that organizes and processes information. Semantics plays a key role in cognitive linguistics. The issue of modern linguistics is not to exclude man from the sphere of research and to take his mental processes as an object of linguistic research. Cognitive linguistics determines how much information is formed in the human brain and how a person uses it when thinking. Affirmation category is also in the focus of cognitive linguistics.

As a semantically unlimited category, the category of affirmativeness is extremely subjective and tends to be divided into judgmental and voluntary sections. The most important requirement of the affirmative index in

grammar is the context of negation. The category of affirmation covers all meanings of affirmative sentences. This makes it a very large and extremely common category. Nevertheless, this category is a logical metalinguistic category with a semantic structure and cognitive scope about the whole world. The most widely used form in all languages is affirmation. Affirmation is not only graded and represented by various means, but also the perception of its application seems to be characterized by sufficient distinction and the possibility of modification. It arises from focusing on word order manipulations, forwarding, inversion, repetition, replication, and duplication. Thus, affirmation is perceived as a mental process - as a positive comparison - used by language users as linguistic expressions at different levels. One of the means

of expression of affirmation is gestures. All cultures have common gestures. Gestures were created at different times, by different peoples. Although they are different from culture to culture, all people on the earth can understand them. The speaker can use different tones in connection with the words he utters, or in order to support the words, change the tone of his voice, make various gestures and facial expressions. There is a theory of self-affirmation in psychology. This theory is closely related to the affirmation that exists in linguistics. According to Walter and Jacobson, *self-affirmations have value, because our subconscious mind plays an important role in reflecting our dreams and realizing our lives*. At the subconscious level, what we believe in ourselves has a significant effect on our life. That is, our lives are easier when we feel good about ourselves. Studies show that positive thoughts and sentences, which are used as affirmations in young people, young children, people with serious illnesses and certain disabilities, have a positive effect when injected subconsciously. The human brain, the human subconscious, sometimes cannot "distinguish" between fantasy and fact, as we can weep while watching a sad movie, knowing that it is just literary characters. Affirmation is widely expressed in functional language styles, because they play an important role in the knowledge of communication, the expression of beliefs and the expression of the inner state of the speaker.

Affirmations can also be reinforced and understood through negation. The affirmation, expressed in various negative ways, can be grouped into several types.

A type of sentence that is not completely ruled out because an alternative idea is put forward within the sentence. a) *He struggled not to sleep until you arrived* b) *He listened to the end without crying*.

The affirmative sentence structure that follows the negative sentence. Increasing the power of a positive sentence is one of the methods used to promote awareness;

*Man is not afraid because he is afraid, he is afraid because he is running away.*

One of the two denials is positive. The purpose of the idea that emerges in this type of sentence is simply to evaluate it as positive information;

*I did not graduate from university in 4 (four) years, I graduated in 6 (six) years.*

*You did not dismiss me, I resigned.*

Here, the affirmation in front of the sentence enhances the method of validating the sentence by rejecting the sentence.

One of the possibilities of expressing affirmation by means of negation is the law of double negation. "Duplex negative affirmation" (Horn 2011). Double negation is commonly used in English. *"He isn't an unhappy boy"* means that he is a happy boy. Other linguistic studies include the term metalinguistic negation. The term was first used by the French linguist Oswald Ducrat, whose metalinguistic negation arose either from the rejection of words that had been spoken before or were in the past. For example, *I am not happy; I am ecstatic*. The word "happy" is negated here because it is insufficient to describe the speaker's feelings. In

other words, although he seems to have denied a claim made in this example, he denies the structure of the statement, not its essence. When the denial is evaluated descriptively, it is seen that the two rulings do not agree with each other, that is, the speaker who says that he is not happy in the first sentence then makes an inconsistent statement by saying "I am happy". On the contrary, metacognitive reading here means that the denial of the speaker's happiness is loaded with the word "happy." The phrase "very happy" is better expressed and indicated.

Palmer claimed that the two negative elements deny each other and form a positive sentence. Otto Jespersen (1939) argued that *"it seems that all languages have a common rule, that two negations make one positive."* Otto Jespersen put it this way: *"The reason this situation occurs is that the pronunciation of the denial is short and does not only add a negative word to the verb. He adds to the other part of the sentence so that the listener can understand its negative tone. That is, so that the negative word is not ignored by the speakers"*. The more syntactic components, the longer the sentence, in fact, the less comprehensible this expression is. It becomes less accepted for the listener. This cognitive feature is well reflected in the double negative sentence [2]. Compared to double negation, affirmative sentences are less short in form and the expression is direct and clear. In terms of language economics, double denial is an unnecessary sentence type. However, double denial is a form of language that is widely used in our daily lives and plays an important role in communication [5]. People want to keep double stubbornness beyond a certain logical account, they use it for a certain pragmatic motivation. Speakers use sign forms to refer to unusual situations that are not common. Horn wrote, "If both expressions have the same connotation, then the sign expression is an addition to the non-sign form because it contains more information"[3].

*The teacher was not displeased with his students the teacher was pleased with his students*. But in my opinion, double denial is not an unnecessary language phenomenon. Although it has a positive meaning, its affirmative degree is different as an affirmative sentence. It strengthens and weakens the affirmation, because the negative elements act as a sign. Of particular importance for the correct understanding of the phenomenon, which is classified as affirmation, lies in the knowledge of human categorization and prototype structures of categories. In reality, the categories related to concepts are the backbone of the language and thought we form. Much of our semantic corrective power depends on the system of conceptual categories and the way they are organized in our thinking. Affirmation is also a construction, which means that it is expressed in the configuration of meaning and form. However, the typical constructive concepts of affirmation may differ in their internal structure and degree of complexity. The constructive approach has many advantages, especially when it comes to the basic semantic nuances that emerge in the grammatical category. Affirmation has all the characteristics of a degree phenomenon, covering many categories, both lexical and

grammatical. In addition, most of its constructive expressions have a multi-layered and hybrid structure. Modality is the most important feature of natural language. In the case of affirmative modality, speakers convey a positive value to the semantic structure of the thought they are expressing, either by emphasizing it or as an additional component. This type of affirmative polarity is advanced in the opposite or negative contexts. Like other types of modality, affirmation can be expressed lexically syntactically and pragmatically. However, in most cases, weak affirmation is a closed, formally unmarked category. As a result, negative sentences are more morphologically and syntactically confused than affirmative counterparts, and the status of negation as a type of modality is more quickly understood. On the other hand, little attention is paid to the rare syntactic realization of sign and empathic affirmations. Such affirmations are closely related to time and aspect, are mainly marked within the verb structure, and are based on a symmetrical comparison of negation [3]. Affirmative modality can be enhanced by advancing lexical amplifiers or numerous manipulative affirmative constructions, doubling afferent forms, and introducing connectors that have a repetitive effect. For example, in the following context, the long form of the verb "to be" "I am" is repeated several times to denote the strong form of the affirmative modality and is reinforced with the conjunction "and". This hyper-affirmative sentence is highlighted as a response to denial or a strong denial. *I don't! I don't want to be a musician! I want to be a lawyer!*

Strong affirmative modality is often applied to parts of complex sentences in which the speaker wants to emphasize a part of the given information.

*What I wanted to say is that learning a foreign language is an intellectual ability.* Affirmation is a mental process and is added to the feedback given by language users. As a result, there is reason to see it as a form of modality. Therefore, affirmative modality has a semantic content and is surrounded by various forms of structural realities. It can range from very weak and abstract to strong and accented expressions. *And the Azerbaijani army proved its strength, and liberated our lands from occupation, and showed all its strength to the world!* - This form of the conjunction indicates the strong emotional feelings of the speaker, and the conjunction,

which is developed before each verb, expresses a strong affirmation. It is not formally expressed in terms of total quantity, but it is very close to it and also expresses the climax of the story.

Despite the fact that the most important indicator of affirmation in grammar is its opposite, but in cognitive linguistics affirmation is the most widespread category. The category of affirmation, one of the two most fundamental mood in the world languages, needs a cognitive overview. According to the article, affirmation can be strong and weak. The rules of intonation can be expressed by the sequence, duplication of verbs, repetition, complete forms of auxiliary verbs and etc. It can be understood as a mental process and can also be understood through functional language means, gestures, different tones of voice, and non-verbal means of communication. Even strong affirmations can arise through denials, double negation, metacognitive negation, and litotes can also participate in the realization of affirmations [5]. Modality is also considered the main means of expression of affirmation, because it is based on very subjective judgments. According to the article, affirmation is a mental process in cognitive linguistics and is widely used by language users.

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## THE REFLECTION OF MARK TWAIN'S CHILDHOOD IN HIS LITERARY ACTIVITY

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## ОТРАЖЕНИЕ ДЕТСТВА МАРКА ТВЕНА В ЕГО ЛИТЕРАТУРНОЙ ДЕЯТЕЛЬНОСТИ

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### Abstract

The article explains the autobiographical description of events and personalities in the works of Mark Twain, known as the "National Genius" of American literature, "King of Laughter". The inspiration and reason of reviving from Twain's childhood memories by some characters such as Becky Thatcher, Tom, aunt Polly, Colonel Sellers, slave Jim etc. in his most famous works including "The Adventures of Tom Sawyer", "The Adventures of Huckleberry Finn" and "The Gilded Age" are explained. This is due to the fact that from an early age he struggled with difficulties in the tumultuous paths of life and wanted to immortalize the fond memories of his childhood and people forever.

### Аннотация

В статье дается автобиографическое описание событий и личностей в произведениях Марка Твена, известного как «национальный гений» американской литературы, «король смеха». Вдохновение и причина возрождения воспоминаний детства Твена некоторыми персонажами, такими как Бекки Тэтчер, Том, тетья Полли, полковник Селлерс, раб Джим и т. д. в его самых известных произведениях, включая «Приключения Тома Сойера», «Приключения Гекльберри Финна». » и «Позолоченный век». Это связано с тем, что он с ранних лет боролся с трудностями на бурных жизненных путях и хотел навсегда увековечить теплые воспоминания о своем детстве и людях.

**Keywords:** Mark Twain, Tom, Huck, childhood memories, Hannibal, prototype.

**Ключевые слова:** Марк Твен, Том, Гек, детские воспоминания, Ганнибал, прототип.

The American writer Mark Twain (Samuel Langhorn Clemens), who conquered the hearts of millions of children and adults with his unique ironic creativity, was not only a writer, but also a journalist, playwright, philosopher, publisher and public figure. Mark Twain also called "King of Laughter" is an extraordinary master of humor and satire, enjoyed not only by Americans, but also by other nations. It is no coincidence that Nobel laureate William Faulkner called Mark Twain "the father of American literature."

Samuel Langhorn Clemens was born on November 30, 1835, in Florida, Missouri. Samuel Clemens wrote about his birth in Florida in his story "Childhood Years": "The village contained a hundred people and I increased the population by one per cent. It is more than many of the best men in the history could have done for a town. It may not be modest in me to refer to this but it is true. There is no record of a person as much-not even Shakespeare. But I did it for Florida. No historical figure can boast that he has done more for his hometown than I have." [2, p.33]

When Samuel was four years old, he and his family moved to Hannibal, a small town. The author would later write in his most beautiful book, "The Adventures of Huckleberry Finn", that this was the city of my childhood and left an indelible mark on my life [1].

Just as Hannibal, Missouri, played a key role in Mark Twain's shaping as a personality, the founder of instinctive realist prose, humorist, and satirist in American literature, the world-famous "King of Laughter," glorified with high impression and made this small province world-wide and famous. The early days of his life in Hannibal provided the basis for many famous characters in American literature. The province was located on the right bank of the Mississippi River, and would later be described as St. Petersburg in "The Adventures of Tom Sawyer" and "The Adventures of Huckleberry Finn".

Mark Twain's father, John Marshall Clemens, was a lawyer who was tough and cold-blooded by character. Unlike his stone-hearted father, Samuel was mild-tempered, and their father-son relationship was cold. Unfortunately they couldn't get along together properly.

His mother, Jane Clemens, was mild-tempered, smiling, and gentle. In one of his speeches, Twain said that he inherited the ability and passion to tell a story from his mother.

Childhood was very valuable and dear to the writer, because these times were associated with the years of independence, associated with freedom and independence, proximity to nature. "The Adventures of Tom Sawyer" and "The Adventures of Huckleberry Finn" are autobiographical works. Although Mark Twain immortalized his childhood and adolescence with vivid and realistic colors, the writer's imagination and creativity were very rich. In little Tom's adventures, the writer turns the American education system into an object of ridicule, looking at the world through the eyes of children. In "The Adventures of Huckleberry Finn", a sequel to the novel, the author's hatred of racial discrimination rises to the level of a social novel with the introduction of a black Jim. He denoted racial discriminations with a dialogue between Tom and a white woman about an explosion on a steamship "We blew out a cylinder-head." [5, p 223].

"Good gracious! anybody hurt?" "No'm. Killed a nigger."

"Well, it's lucky; because sometimes people do get hurt."

*Two years ago last Christmas your uncle Silas was coming up from New Orleans on the old Lally Rook, and she blew out a cylinder-head and crippled a man...*

In "The Adventures of Tom Sawyer", many aspects of Mark Twain's childhood are revealed. The city of St. Petersburg described in the work is reminiscent of the city of Hannibal in the 1840s.

In the novel, little Tom's first love is an innocent, naive, shy little girl - Becky Thatcher, one of the characters inspired by Mark Twain's childhood. The image of Becky Thatcher is a prototype of Laura Hawkins, a childhood friend and first love of Samuel Clemens. Like Mark Twain, Laura Hawkins's family moved to Hannibal as a child and lived on the same street as the Clemens family. Laura and Samuel were schoolmates. In addition to "The Adventures of Tom Sawyer", Laura

Howkins was also included into "The Gilded age" (1873) as a main role. This work shed light on the American socio-political panorama of the time, revealing Twain's civic stance, his principles, and his intolerance of injustice.

Sawyer's half-brother Sid is reminiscent of Mark Twain's younger brother Henry. It should be noted that Henry was Samuel Langhorn Clemens' younger brother, and Twain began working on the ship at his insistence during his years as a pilot, but died in an accident there. Henry was killed tragically in an explosion on the steamboat *Pennsylvania* at the age of 20. Mark Twain, who had dreamed of Henry's death a month earlier, could never forgive himself for it. The image of Tom is a prototype of Twain's two best friends from childhood and little Samuel Clemens. They are Mark Twain's childhood friends John Briggs and William Bonen. Tom's character is an autobiographical character. Tom's painting of the fence, the appearance of a puppy there during a sermon in the church, conversations with Huck about a dead cat, or the removal of Tom's baby tooth are all childish approaches to the adult world.

"The Adventures of Huckleberry Finn", a sequel to "Tom Sawyer's Adventures", also features moments from Mark Twain's life. The protagonist of "The adventures of Huckleberry Finn" was a prototype of Tom Blankenship, a childhood friend of the great writer Hannibal. He was four years older than Twain. Tom Blankenship's family lived in poverty, and his father was just like the Pap (He was an undesirable father in "Adventures of Huckleberry Finn"), the father of Huckleberry Finn. "My father had not been seen in our city for more than a year, therefore I was very confident; I didn't want to see him again. Although I often ran into the woods when he saw me wandering, he was beating me badly as I passed by"[ 4, p.205 ].

Although Tom Blankenship was ignorant, illiterate, filthy, and careless, but he was a very simple-hearted, kind man. As Twain later wrote in his autobiography: His freedom was unlimited. He was the only independent person in the society. Others envied him for that. " [6].

The novel was one of the first American novels to be written using folk idioms and local dialects, highlighting both the sights of Twain's youth and the social and cultural environment of the time. In writing this novel, Twain not only spent his happy childhood in Hannibal, but also showed the dark and bad side of the state, such as racism and slavery.

Mark Twain made an innovation in the history of literature with vivid and expressive depictions of several famous characters. Through these characters in the

"The Gilded age", he was able to create illusory nuances and points of pride with the power of the artistic word. One of these characters is Colonel Sellers. "His prototype was Twain's uncle James Lampton." [ 3, p.701]. A This man was extremely dreamy. He dreams of success and pursues dreams that do not correspond to reality. It seems to him that he will just catch a bird of success, earn millions, benefit all mankind, and more precisely, improve the material well-being of his relatives. But in reality, life tells him something else: all his projects are ruined, Sellers' family falls to the bottom of life, becomes poor, struggles not to die, not to starve. The family is fed by Sellers' beliefs - boiled turnips and water. According to Sellers, this is actually the best diet, a high-calorie meal. Mark Twain wrote in his story about his childhood years: "I have never met anyone more merciful than my uncle James. After we moved to Hannibal, I stayed on my uncle's farm for two or three months a year until I was 11 or 12. "In *Huckleberry Finn*" and "The Adventures of Tom Sawyer", I brought this farm to Arkansas."

Twain witnessed slavery as a child before becoming a public defender of black rights. Missouri was a slave state, and both Twain's father and several members of the Clemens family owned slaves. As a child, Twain spent his summers on his uncle's farm listening to stories told by slaves and workers, including Uncle Daniel. The story of Tom Blankenship's brother who helped a negro escape from slavery in Mark Twain's childhood years, became a source of inspiration for the relationship with the black Jim and Finn in the novel "The adventures of Huckleberry Finn".

In conclusion, in the works of the world-famous writer Mark Twain, there are autobiographical moments and vivid landscapes of his childhood. We think that this is directly related to the fact that from an early age he struggled with difficulties in the turbulent ways of life, and the pleasant memories of his childhood and the desire to keep people alive forever.

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# TECHNICAL SCIENCES

## SYNTHESIS AND TECHNOLOGY OF OBTAINING QUATERNARY AMMONIUM SALTS BASED ON OLEFINS

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### Abstract

This article presents the results of the synthesis and study of quaternary ammonium salts based on hexene isomers. The process of obtaining isohexylmonochloroacetate based on hexene isomers with monochloroacetic acid and the interaction of the obtained product with triethylamine were studied and quaternary ammonium salts were obtained. The effect of initial reagents and temperature on the rate of the quaternization reaction has been studied. The rate constants of the Menshutkin reaction were determined for various temperatures. A basic technological scheme for the synthesis of quaternary ammonium compounds is proposed.

**Keywords:** quaternary ammonium salts, hexene isomers, isohexylmonochloroacetate, monochloroacetic acid, triethylamine, quaternization reaction.

### 1. Introduction

At present, quaternary ammonium salts (QASs) attract the attention of many researchers and scientists around the world. Quaternary ammonium salts are odorless, colorless, characterized by a moderately broad spectrum of antimicrobial activity, residual bacteriostatic effect on treated surfaces, have corrosive activity, efficiency in a wide pH range, resistance to high temperatures, low toxicity [1].

In these years, the phenomena of penicillin-resistant bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA), or even the emerging of SARS-CoV-2, revived the urgent need in development of QASs again [2,3]. Quaternary ammonium compound (QAC) with positively charged N atom and long-chain alkyl, exhibits efficient antibacterial functions [4-6].

The industrial production of quaternary ammonium compounds continues to maintain a leading position due to their steadily growing demand. They are used as target products, feedstock and intermediate products in various chemical and petrochemical synthesis, in the production of composite materials for various fields of chemistry and petrochemistry, in the plastics industry, synthetic resins, electronics, metalworking and chemical-pharmaceutical industries, for the needs of agriculture, farming and production of household chemicals [7,8]. These productions in many countries of the world are large-, medium- and small-tonnage, as well as diverse in terms of the range of marketable products produced.[9].

In order to expand the base of starting materials for obtaining functionally substituted ammonium compounds, we have synthesized quaternary ammonium salts. This article presents the results of the synthesis and study of quaternary ammonium compounds based on hexene isomers. The process of obtaining quaternary

ammonium compounds consists of two stages: at the first stage, the reaction of esterification of higher olefins with monochloroacetic acid occurs, and at the second stage, the reaction of quaternization of the synthesized isoalkylmonochloroacetates with triethylamine [10].

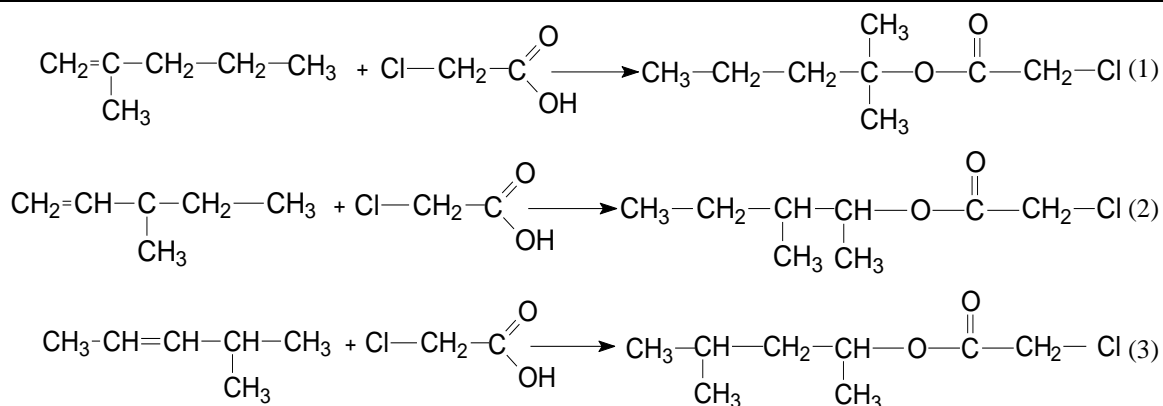
### 2. Methods and materials

Synthesis of isohexylmonochloroacetate. The calculated amount of monochloroacetic acid was loaded into the flask and hexene isomer was added, sulfuric acid was used as a catalyst. The temperature of the reaction mass was varied at 60-70°C for 6 hours. After completion of the reaction, the catalyst was separated by treatment with a 10% alkali solution, and the mixture was subjected to vacuum distillation. The yield of the reaction product isohexylmonochloroacetate is 86% of theoretical. The synthesized isohexylmonochloroacetates are colorless liquids; highly soluble in organic solvents such as acetone, toluene, isopropyl alcohol, diethyl ether, carbon tetrachloride.

**Synthesis of quaternary ammonium salts.** In a three-necked flask equipped with a mechanical stirrer, a condenser, and an addition funnel, a calculated amount of 1 mol of isohexylmonochloroacetate was placed with constant stirring, triethylamine was added through an addition funnel. The temperature of the salt formation reaction was maintained in the range from +20 to 30 °C. Upon reaching the maximum yield, the forming crystals were filtered off on a Schott filter and dried in a vacuum desiccator at room temperature. Salt yield was 92-95%. The obtained substances were analyzed by IR-spectroscopy.

### 3. Results and discussion

The esterification reaction of hexene isomers with monochloroacetic acid (MCAA) in the presence of a catalyst can be described by the following equations:



Benzene, dimethylformamide (DMFA) and 1,4-dioxane were used to study the influence of the nature of the solvent for the reaction (Fig. 1).

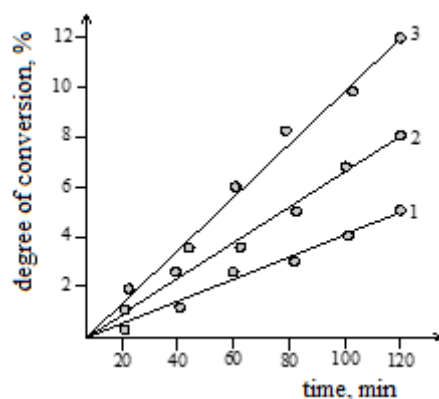


Fig.1. Influence of the nature of the solvent on the ester yield during the esterification of 2-methyl-1-pentene with monochloroacetic acid: 1- benzene; 2-1,4-dioxane; 3-DMFA;  $t=60^\circ\text{C}$ .

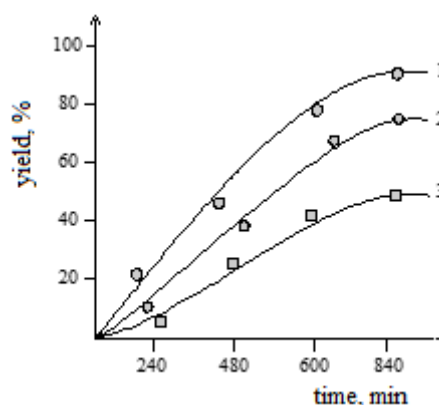


Fig.2. Effect of olefin nature on ester yield: (1) 2-methylpentene-1; (2) 3-methylpentene-1; (3) 4-methylpentene-2,  $T=60^\circ\text{C}$ .

As can be seen, with an increase in the dielectric constant of the solvent, the reaction rate and the degree of ester conversion increase, and the highest reaction rate is observed in DMFA (Fig. 1). When studying the influence of the nature of olefins on the ester yield, 2-methylpentene-1, 3-methylpentene-1 and 4-methylpentene-2 were used as initial reagents in the experiments (Fig. 2). Graphical dependences of the values of the degree of conversion and total rates on the nature of hexenes are shown in Figure 2. They are linear in nature and the highest rate, and the product yield is observed during the esterification of 2-methyl-1-pentene with monochloroacetic acid (MCAA) [11].

The data obtained from the study of the effect of temperature and the ratio of the initial reagents on the ester yield show that an increase in the reaction temperature and olefin concentration leads to an increase in the ester yield, the highest yield is observed when the process temperature rises to  $60^\circ\text{C}$  and the ratio of olefin to MCAA = 3:1. IR spectroscopy methods were used to establish the structure of the starting substances and the products obtained. In the IR spectra of the synthesized esters of isohexylmonochloroacetates, there are absorption bands in the regions:  $\nu_{\text{C=O}}=1683-1714\text{ cm}^{-1}$ ;  $\nu_{\text{C-O-C}}=1256\text{ cm}^{-1}$ ;  $\nu_{\text{C-Cl}}=661\text{ cm}^{-1}$  (Fig.3).

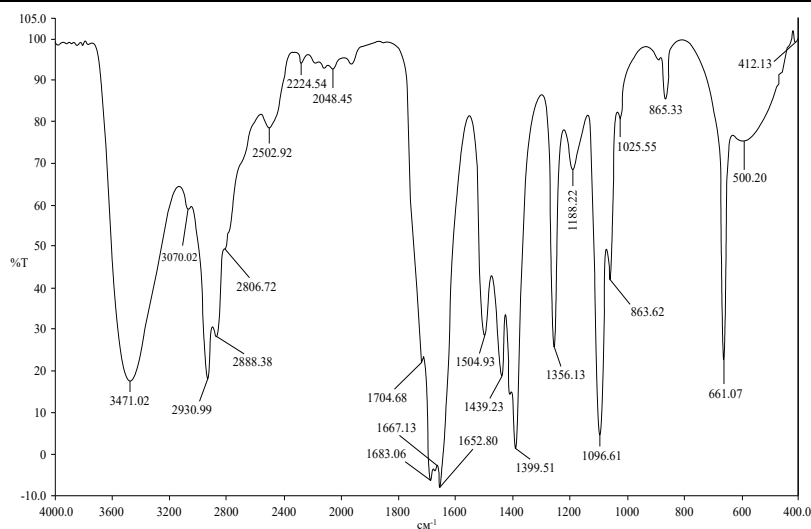
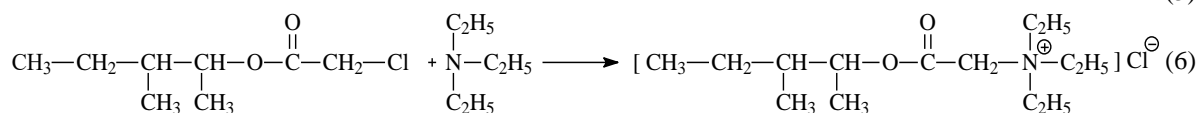
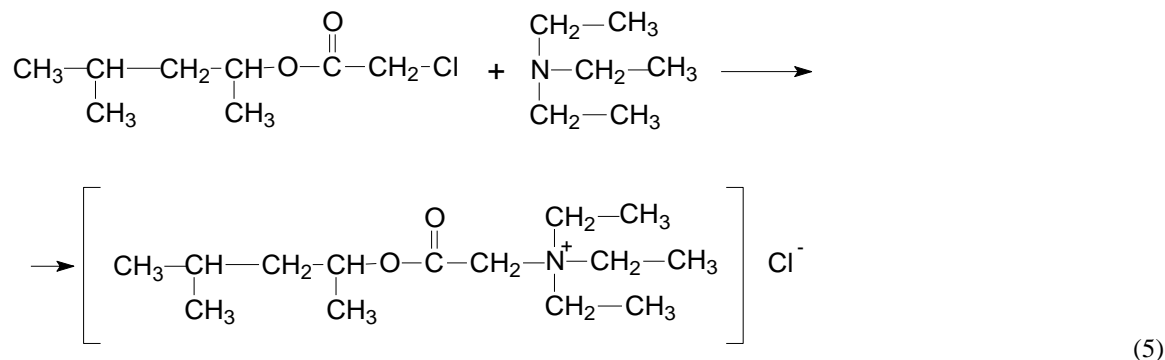
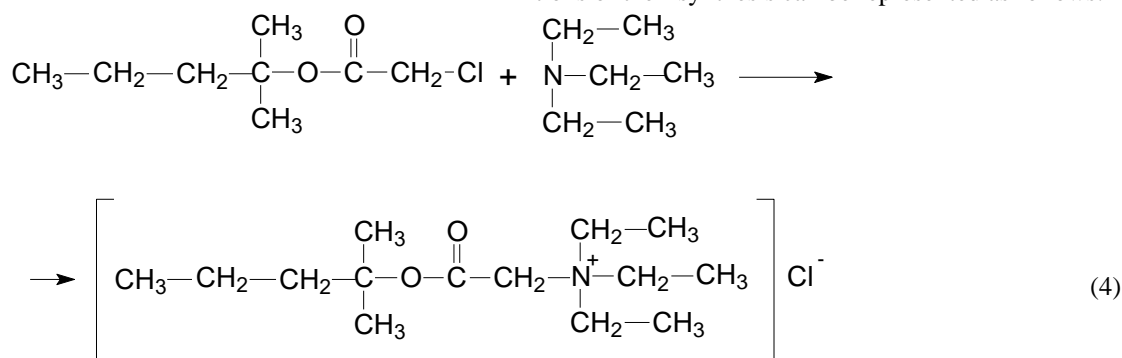


Fig.3. IR spectrum of isohexylmonochloroacetate based on 2-methyl-1-pentene with monochloroacetate

At the second stage of the synthesis of quaternary ammonium salts, isohexylmonochloroacetates (IH-

MCIA) were used as an alkylating agent in the quaternization reaction with trimethylamine (TEA). The reactions of their synthesis can be represented as follows:



The structure of the synthesized quaternary salts was proved by the data of IR spectroscopy and elemental analysis. In the IR spectra of QAS, the appearance of an absorption band in the region of 2976–2940  $\text{cm}^{-1}$  is observed, which indicates the presence of salt

formation, while absorption bands in the region of 1398–1476  $\text{cm}^{-1}$  are characteristic of bending vibrations of methylene groups combined with ammonium nitrogen (Fig. 4).

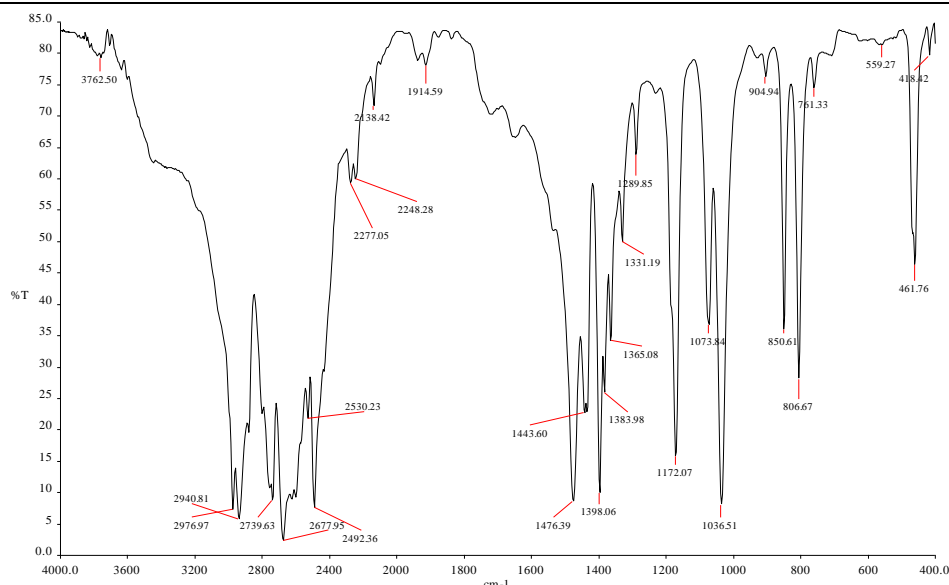


Fig.4. IR spectrum of the quaternary salt of isohexylmonochloroacetate with triethylamine.

It was found that the practically found elemental composition coincides with the calculated one (Table 1).

Table 1

Elemental composition of synthesized chloride salts

№	Bruttoformula	Elemental composition									
		computed					found				
		C	H	N	Cl	O	C	H	N	Cl	O
1.	$C_{14}H_{30}NO_2Cl$	60.1	10.7	5	12.7	11.5	60	10.8	5.1	12.5	11.6
2.	$C_{14}H_{30}NO_2Cl$	60.1	10.7	5	12.7	11.5	59.9	10.6	5.3	12.6	11.6

The synthesized ammonium quaternary salts are soluble in water, acetone, benzene, dimethylformamide, slightly soluble in 1,4-dioxane, do not dissolve in diethyl ether. In this work, we studied the influence of various factors: temperature, the ratio of initial reagents, and the duration of the reaction on the QAS

yield. The results of experimental studies on the effect of reaction temperature on the QAS yield are shown in Figure 5. The results obtained show a directly proportional dependence of the product yields on the process temperature, that the maximum QAS yields are observed at 30 °C.

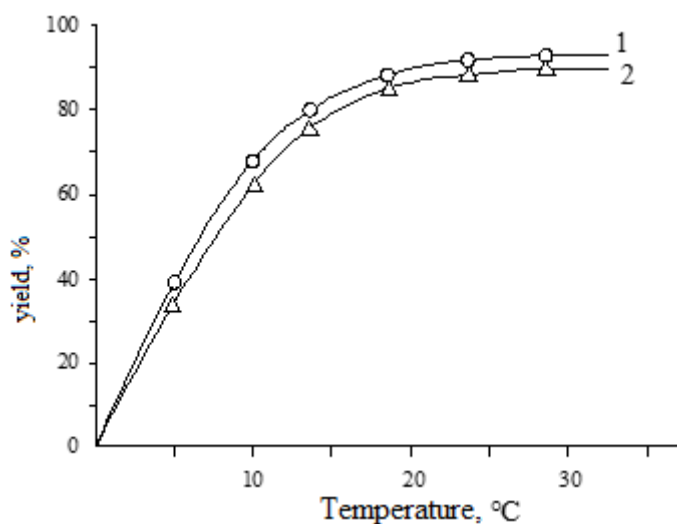


Fig.5. Effect of temperature on the yield QAS: 1–IHMClA:TEA=1.0:1.2, 2– IHMClA:TEA=1.0:1.2; in mass, reaction time 4 hours.

It can be seen from the figure that the rate of the reaction under study increases with increasing temperature and a further increase in temperature does not affect the yield of the product. Next, the influence of the

reaction duration on the yield of the formed QAS was studied (Fig. 6).

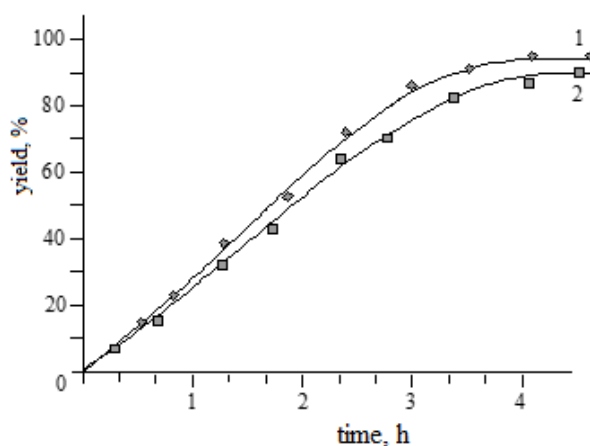


Fig. 6. Influence of the reaction time on the yield HOURS (30 °C):  
1- IHMClA:TEA = 1.0:1.2, 2- IHMClA:TEA = 1.0:1.2, in mass.

From the graphs showing the dependence of QAC yields on the duration of the reaction, it follows that the interaction of isohexylmonochloroacetate with triethylamine is carried out in 4 hours.

The kinetic orders of the quaternization reaction of isohexylmonochloroacetate with triethylamine were determined (Fig. 7 and 8).

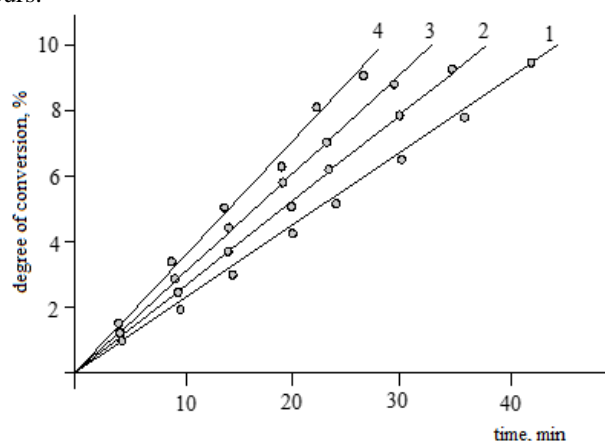


Fig. 7. Dependence of the quaternization rate of [IHMClA]:[TEA] on the concentration of TEA;  
[IHMClA]=1,0 mol/l; [TEA], mol/l: 1-1,0; 2-1,25; 3-1,5; 4-2,0; T=30 °C.  
The solvent is DMFA.

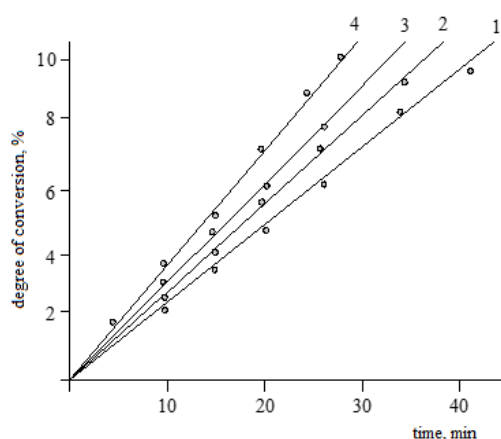


Fig. 8. Dependence of the quaternization rate of [IHMClA]:[TEA] on the concentration of IHMClA;  
[TEA]=1.0 mol/l; [IHMClA], mol/l: 1-1.0; 2-1.25; 3-1.5; 4-2.0.  
The solvent is DMFA; T=30 °C.

As can be seen from Fig. 7 and 8, with an increase in the concentration of the initial reagents, the rate of the quaternization reaction increases.

To determine the order of the reaction, we conducted experiments on the dependence of the rate of the quaternization reaction on the concentration of the initial components (Fig. 9).

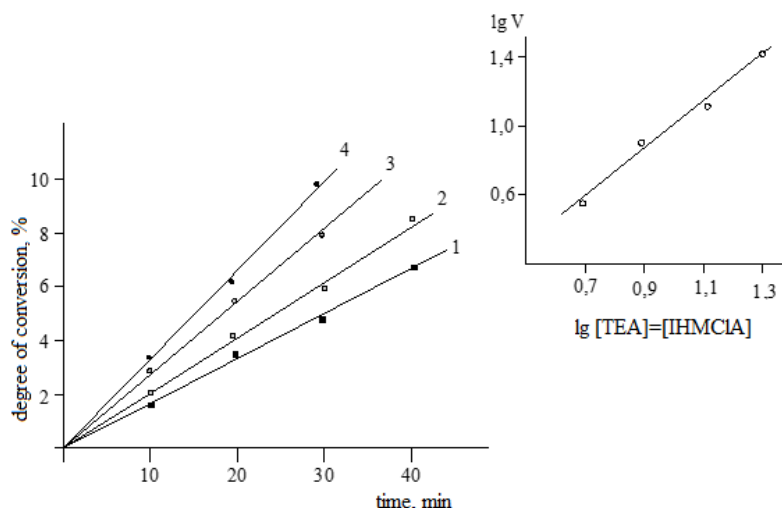


Fig.9- Dependence of the quaternization rate in the TEA-IHMCIA system on the concentration of the initial components.

$[TEA]=[IHMCIA]$ , mol/l: 0.5 (1); 1.0 (2); 1.5 (3); 2.0 (4).  $T=30\text{ }^{\circ}\text{C}$ ; The solvent is DMFA.

The results obtained from Figure 9 also show that the reaction is characterized by the second order in terms of the concentration of the initial components.

Based on the experimental data obtained and according to certain laws of the Menshutkin reaction, the rate of this reaction can be written by the following equation:

$$V = \frac{dx}{dt} = K_M * x * y$$

where,  $K_M$  – Menshutkin reaction constants;  $x$  - initial concentration of TEA;  $y$  - initial concentration of IHMCIA.

As can be seen, the  $x$ -value of the reaction is characterized by the second order.

The value of the Menshutkin reaction rate constant for various temperatures was determined (Table 2).

Table 2

Rate constants of the Menshutkin reaction in the TEA-IHMCIA system in DMFA at different temperatures

T, $^{\circ}\text{C}$	Initial ratio of components, mol/l		$V_M * 10^6$ mol/l * s	$K_M * 10^6$
	TEA	IHMCIA		
20	1,0	1,0	0,61	0,26
20	1,25	1,25	0,96	0,37
20	1,5	1,5	1,22	0,56
20	2,0	2,0	1,65	0,50
30	1,0	1,0	0,45	1,64
30	1,25	1,25	1,20	1,14
30	1,5	1,5	2,42	1,06
30	2,0	2,0	3,5	0,90

Investigation of the effect of temperature on the yield of quaternary ammonium salts, that with an increase in the temperature of the quaternization reaction, the yield of QAS increases and reaches its maximum value of 95% at a temperature of  $30\text{ }^{\circ}\text{C}$ .

The value of the Menshutkin reaction rate in the temperature range  $10\text{--}30\text{ }^{\circ}\text{C}$  was used to calculate the

activation energy of the Menshutkin reaction for the  $[TEA]=[IHMCIA]$  system, which is  $61.5\text{ kJ/mol}$ .

Further, thermoanalytical studies of the synthesized quaternary salts were carried out (Fig. 10,11 and 12).



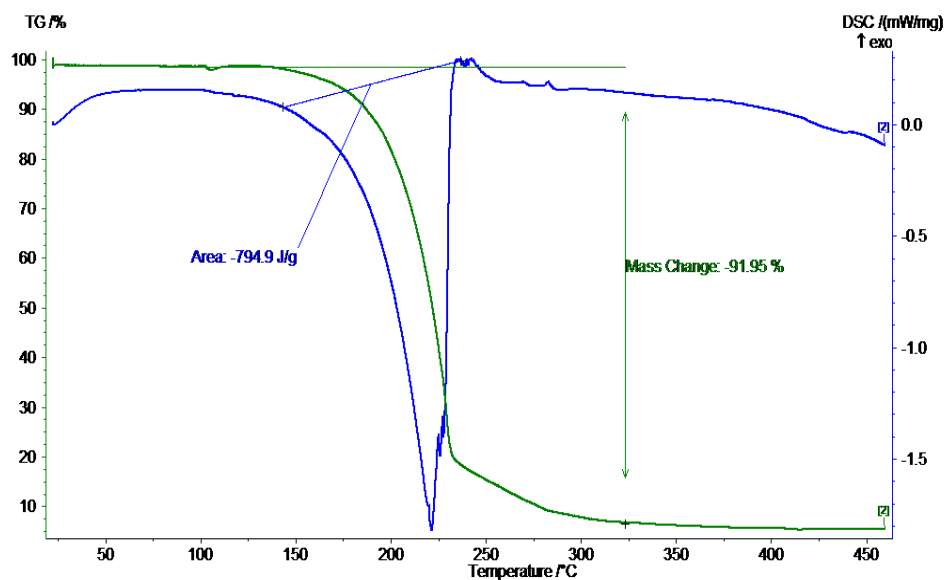


Fig.10. Thermogram of a quaternary salt based on trimethylamine with isohexylmonochloroacetate (1-sample)

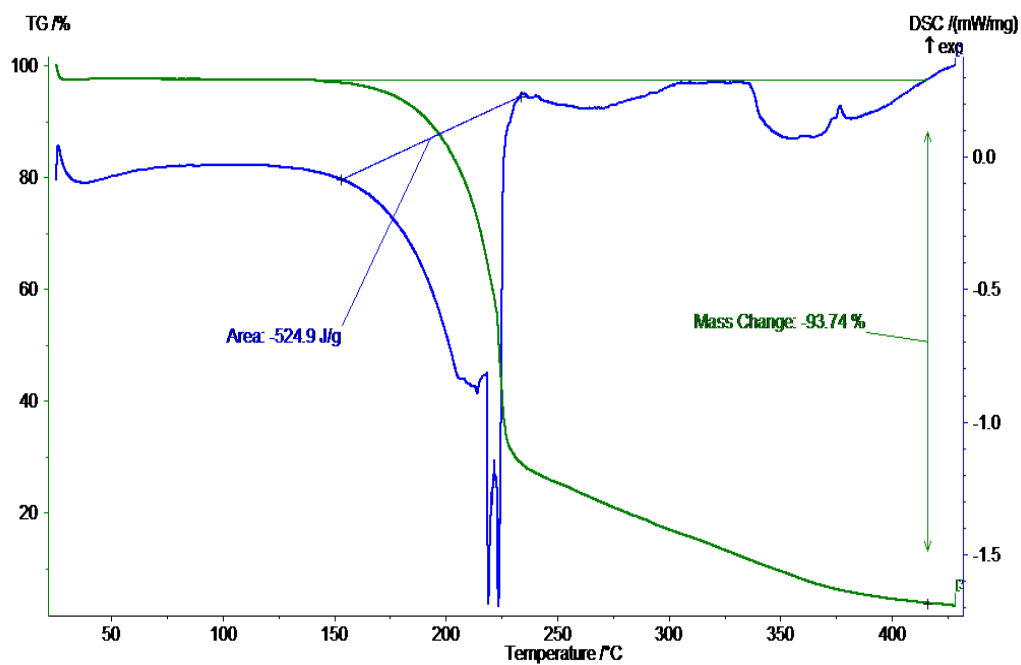


Fig.11. Thermogram of a quaternary salt based on triethylamine with 3-methyl-pentylmonochloroacetate (2-sample)

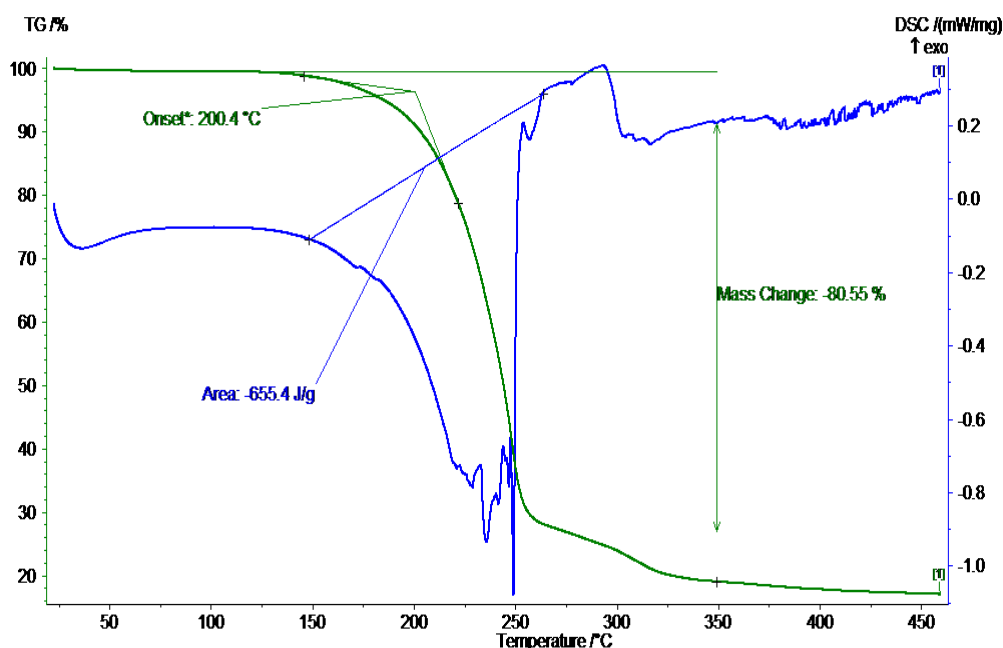


Fig.11. Thermogram of a quaternary salt based on triethylamine with 4-methyl-pentylmonochloroacetate (3-sample)

As can be seen from the thermograms, endothermic peaks are observed at 220-240 °C. The synthesized quaternary salts are stable up to a temperature of 160°C. At a temperature of 160 °C, melting occurs, followed by decomposition of the sample. In the temperature range of 160-250 °C, sample 1 loses weight up to 91.9%, sample 2 93.7%, and sample 3 80.5%. The corresponding endothermic peaks have a max at 220-230 °C. This weight loss apparently corresponds to the release of volatile components CO<sub>2</sub>, NH<sub>3</sub>, HCl, H<sub>2</sub>O.

#### Principal technological scheme for the production of quaternary ammonium salt

As a result of the studies described above, a basic technological scheme for the synthesis of quaternary ammonium compounds was proposed (Fig. 13).

The synthesis of quaternary ammonium salts consists of the following stages:

- 1) preparation and loading of initial reagents (olefin, monochloroacetic acid, solvent and catalyst);
- 2) esterification of the olefin with monochloroacetic acid;
- 3) purification and separation of reaction products;
- 4) quaternization reaction of the resulting isoalkyl-monochloroacetates with triethylamine;
- 5) filtration, washing and drying of quaternary salts.

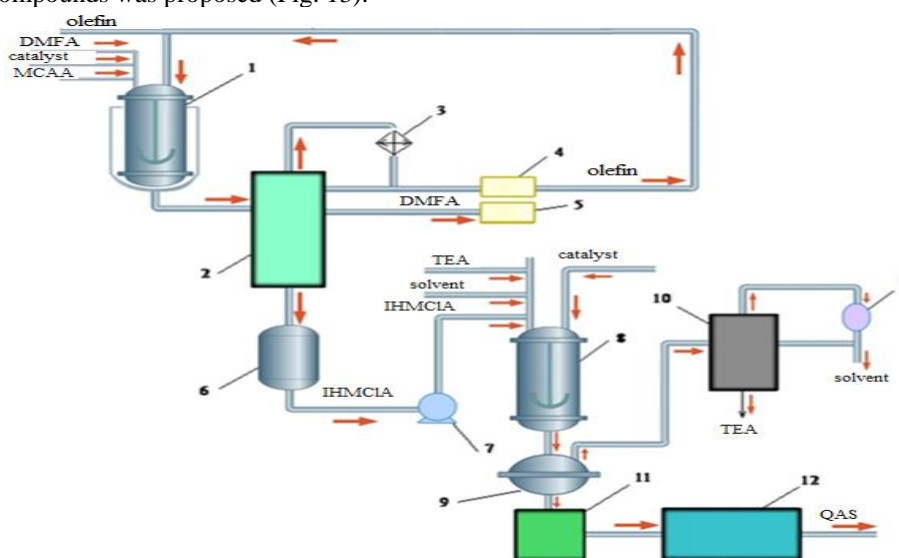


Fig. 13-Principal technological scheme for the production of Quaternary ammonium salt  
1,8-reactors; 2-distilling column; 3-water condenser; 4,5 receivers;  
6-intermediate capacity; 7-pump; 9-filter; 10-distillation column;  
11-washing apparatus; 12-vacuum evaporator

The synthesis of isohexylmonochloroacetates is carried out in the reactor 1, equipped with a stirrer jacket, fittings for loading reagents. The calculated amount of olefin, dimethylformamide, monochloroacetate and catalyst is loaded into the reactor 1 and mixing is carried out. The esterification process is carried out with constant stirring at 60 °C for 8 hours. After the end of the reaction, the stirring is stopped and the resulting product is fed into the stripping column 2, where the olefin and dimethylformamide are distilled off at atmospheric pressure. Pairs of olefin and DMF are condensed in the condenser 3 and enter the receivers 4,5, respectively. The olefin and dimethylformamide are returned to the esterification stage, the reaction product isohexylmonochloroacetate through an intermediate vessel 6 and a pump 7 is fed into the jacketed reactor 8. Triethylamine, a solvent, is also supplied there. At the same time, white needle-shaped crystals begin to fall out. The reaction is carried out at 300C for 4 hours. At the end of the process, the reaction mass is passed through a filter 9, where a solid precipitate is separated from it, and fed to a film evaporator 10. In the evaporator, the solvent boils off, which, after condensation, is recycled for quaternization. The remaining white crystals are sent for washing with acetone in apparatus 11 and a vacuum evaporator 12 is fed. Ready-made quaternary ammonium salts are sent for packaging.

#### 4. Conclusions

Thus, quaternary ammonium salts were synthesized in two steps based on triethylamine and isohexylmonochloroacetate. The effect of the nature of the solvent, temperature, and ratio of the initial reagents on the rate of the quaternization reaction and the yield of the product were determined. The structure of the synthesized compounds was proved using the methods of IR-spectroscopy. Thermoanalytical studies of the synthesized quaternary salts were carried out.

Principal technological scheme for the production of Quaternary ammonium salt has been developed.

**Competing interest.** Authors have declared that no competing interests exist.

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Андижан, Узбекистан***Abstract**

This article is devoted to the study of topical problems of renewable energy sources. Experiments have shown how to determine the efficiency of a solar collector by changing the pump power.

**Аннотация**

Данная статья посвящена изучению актуальных проблем возобновляемых источников энергии. Эксперименты показали, как определить КПД солнечного коллектора при изменении мощности накачки.

**Keywords:** multimeter, intensity, efficiency solar collector, temperature sensor.

**Ключевые слова:** мультиметр, интенсивность, КПД коллектора, датчик температуры.

В то время, когда современные технологии развиваются, рост населения также приводит к резкому увеличению спроса на энергию. На планете ощущается нехватка энергии. Это связано с резким сокращением невозобновляемых источников энергии – сухого и жидкого топлива. В результате на планете происходят резкие перепады температур и учащение различных природных катаклизмов. Кроме того, использование этих источников энер-

гии вызывает экологическую проблему – острое загрязнение воздуха. Чтобы предотвратить такие глобальные энергетические и экологические проблемы, человечество нуждается в возобновляемых источниках энергии. К ним относятся водная, ветровая, атомная, солнечная и биогазовая энергия. [1].

Солнце – неисчерпаемый источник энергии для Земли. Однако люди используют лишь малую

его часть. Создание солнечных и электрических силовых и отопительных приборов увеличило доступ людей к энергии. Известно, что по мере увеличения спроса на электроэнергию разрабатываются более удобные, эффективные, безопасные и доступные способы получения электроэнергии [2]. Однако особенно актуален вопрос энергосбережения. Поэтому все активнее запускаются специальные устройства, позволяющие направить солнечную энергию на решение практических задач. Одним из таких устройств является солнечный коллектор, который можно эффективно использовать для отопления или горячего водоснабжения.

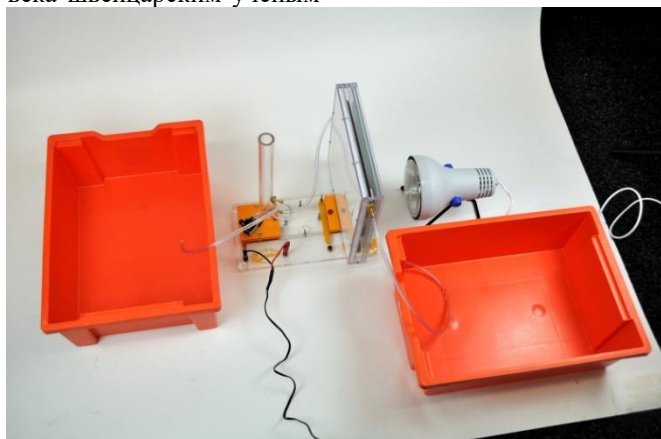
Используя солнечную энергию в солнечном коллекторе, солнечная энергия преобразуется в тепловую энергию на основе нагрева воды внутри коллектора. Эта тепловая энергия может быть использована для снабжения населения горячей водой и обогрева помещений.

Коллекторы в основном изготавливаются из теплопроводных материалов, таких как сталь, медь и алюминий. Простейший коллектор работает, нагревая жидкость, используя тепловую энергию солнца или других источников тепла, когда вода течет по тонкой черной трубке.

Первая модель солнечного коллектора была создана в конце XVIII века швейцарским ученым

Горацио Соссюром и состояла из стеклянного и деревянного ящика со слоем тепла внутри. В то время я думал, что это «маленький, дешевый и простой». Такие устройства стали применяться на практике в конце XIX века для нагрева горячей воды. Начал выпускаться содовый солнечный коллектор в виде черного бака с черной краской на деревянной стороне, закрытого закрытым стеклом и обращенного к солнцу. В таких коллекторах вода вечером была не горячей, и приходилось ждать следующего дня, пока она нагреется. Это устройство было усовершенствовано и создан современный плоский коллектор. В этом случае бак, наполненный водой, был отделен от аппарата, а теплота передавалась ему по теплообменному контуру.

На сегодняшний день солнечные коллекторы стали самым эффективным устройством для использования солнечной энергии. Если фотоэлектрические панели используют 14-18% получаемой ими солнечной энергии, то этот КПД в солнечном коллекторе достигнет 70-80%. С целью дальнейшего повышения этого показателя, для дальнейшего повышения эффективности коллектора мы исследовали работу коллектора в лабораторных условиях.



**Фигура 1.** Лаборатория солнечного коллектора опыт работы состояние

Используемые инструменты:

- 2х бассейн с водой
- насос
- Коллектор
- Датчик температуры
- мультиметр
- шланги

Как показано на рисунке, мы разместили солнечный коллектор и насосный модуль в расширительном бачке в основном блоке и соединили модули закрытыми шлангами, обратив внимание на нижнее соединение левого расширительного бачка и правильное соединение с левым бачком. Затем нижний штуцер расширительного бака соединяется с верхним штуцером коллектора и правым резервуаром коллектора.

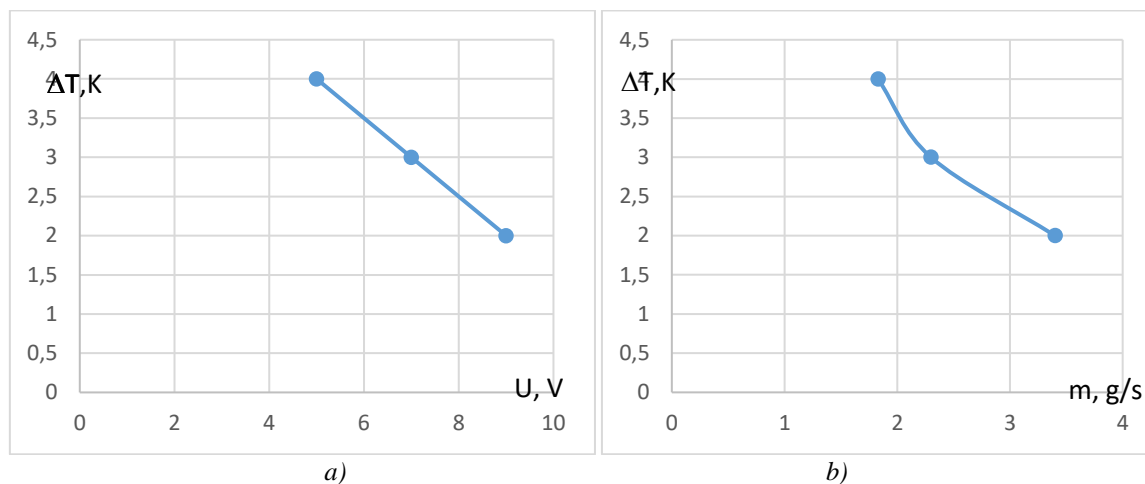
Теперь залили воду в расширительный бачок и подключили Модуль питания к базе (9В). Теперь эта вода приводит к коррозии контактов. При необходимости мы наполняли мерный стакан водой до тех пор, пока не установилась устойчивая водная цепочка с объемом около 200 мл жидкости. Мы осторожно повернули, чтобы удалить оставшиеся воздушные карманы из коллектора.

Лампу поставили на расстоянии 20 см перед коллектором, а на насос установили УП напряжением 5В. Температура потока воды измерялась на дне коллектора. Через 5 минут измерили температуру (Твых) на высоком подключении водопроводного коллектора. Испытание повторяли еще для двух напряжений на УП насоса и измеренные значения заносили в таблицу.

**Полученные результаты.**

Таблица 1

Физические параметры, полученные в ходе эксперимента с солнечным коллектором			
$U_p$ in V	5	7	9
$\dot{m}$ in g/s	1.83	2.3	3.4
$T_{in}$ in $^{\circ}C$	17	17	17
$T_{out}$ in $^{\circ}C$	21	20	19
$\Delta T$ in K	4	3	2



**Фигура 2.** а) зависимость изменения температуры воды  $\Delta T$  солнечного коллектора от напряжения  $U$  и б) зависимость изменения температуры воды  $\Delta T$  от массы воды  $m$ , протекающей через коллектор в единицу времени  $t$ .

Эффективность коллектора рассчитывается по следующей формуле.

$$\eta_K = \frac{A_F}{A_{um}} = \frac{Q_K}{W_1 + W_2} \quad (1)$$

$$Q_K = m \cdot c \cdot \Delta T \quad (2)$$

$$W_1 = I_y \cdot S_K \cdot t; W_2 = P \cdot t \quad (3)$$

Здесь  $Q_K$  - тепловая энергия воды в коллекторе;  
 $m$  - Масса воды, вытекающей из коллектора за 1 секунду;

$c = 4200 \text{ J/kg} \cdot \text{K}$  - удельная теплоемкость воды;

$\Delta T$  - разница между начальной и конечной температурами воды;

$I_y$  - сила света лампы;

$S_K$  - поверхность, с которой падает свет на коллектор;

$t$  - время;

$P$  - мощность лампы;

Результат:  $S_2 = 2\pi \cdot R \cdot h$ ;  $S_{sirt} = S_1 + S_2$ ;  $R = 0.8 \text{ sm}$ ;  
 $h = 171.5 \text{ sm}$

$$S_2 = 2\pi \cdot 0.8 \cdot h = 1.6\pi \cdot 174 \text{ (sm)}^2 = 278\pi \text{ (sm)}^2$$

$$A_K = S_{sirt} = S_1 + S_2 = 0.64\pi \text{ (sm)}^2 + 278\pi \text{ (sm)}^2 = 876\pi \text{ (sm)}^2$$

$$Q_{KN} = 2.3 \cdot 10^{-3} \cdot 4200 \cdot 3 = 29 \text{ W}$$

$$\eta_K = \frac{Q_{KN}}{E \cdot A_K(2/3)} = \frac{29 \text{ W}}{\frac{800 \text{ W}}{\text{m}^2} \cdot 584 \cdot 10^{-4} \text{ m}^2} = 62\%$$

$$\eta_K = \frac{Q_{KN}}{E \cdot A_K(1/2)} = \frac{29 \text{ W}}{\frac{800 \text{ W}}{\text{m}^2} \cdot 438 \cdot 10^{-4} \text{ m}^2} = 83\%$$

**Выводы.** Этот эксперимент отличается от опытов с другим коллектором тем, что вода выкачивается из одной емкости и переливается в другую. Через определенное время измеряют и сравнивают температуру первой воды, а затем температуру нагретой воды. Эксперимент проводится при вращении насоса при различных напряжениях. Наши результаты показывают, что чем ниже напряжение насоса, тем меньше количество воды, вытекающей из коллектора. Следует отметить, что по мере увеличения напряжения насоса количество воды увеличивается и вода движется быстрее, поэтому можно наблюдать, что температура в соседнем сосуде несколько снижается. Приведенные выше результаты доказали, что чем больше модуль освещения падает на поверхность коллектора, тем лучше эффект эффективности коллектора.

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## METHODS FOR INCREASING THE OPTICAL PROPERTIES OF SOLAR CELLS BASED ON SILICON

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## МЕТОДЫ ПОВЫШЕНИЯ ОПТИЧЕСКИХ СВОЙСТВ ФОТОЭЛЕМЕНТОВ НА ОСНОВЕ КРЕМНИЯ

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### Abstract

The article describes ways to improve the optical properties of silicon-based solar cells using the *PVLightHouse* online application.

### Аннотация

В статье описаны способы повышения оптических свойств солнечных элементов на основе кремния с помощью онлайн-приложения *PVLightHouse*.

**Keywords:** solar cell, p-n junction, optical layer, photogeneration, amorphous silicon, lithium fluoride, homo- and heterojunction.

**Ключевые слова:** фотоэлемент, p-n переход, оптический слой, фотогенерация, аморфный кремний, фторид лития, гомо- и гетеропереход.

В то время, когда технологии развиваются во всем мире, спрос на электроэнергию также увеличивается с каждым днем. Одна из наших основных потребностей — вырабатывать электроэнергию легко, удобно, рентабельно и, самое главное, без вреда для здоровья человека. Известно, что наиболее распространены способы получения электроэнергии от гидроэлектростанций (ГЭС) и тепловых электростанций (ТЭС). Однако токсичные вещества, выбрасываемые в атмосферу тепловыми электростанциями, оказывают негативное влияние не только на жизнь человека, но и на защиту всего живого, растений и окружающей среды. Кроме того, остается проблемой обеспечение равного электроснабжения всего населения. Для решения таких проблем в настоящее время во многих городах и селах в качестве источников энергии используются возобновляемые источники энергии. На сегодняшний день в мире ведется множество исследований и разработок по широкому использованию возобновляемых источников энергии и их эффективности [1]. Среди таких вопросов повышение эффективности солнечных элементов, максимизация их эффек-

тивности является основной задачей каждого исследователя [2]. Имея в виду эти задачи, мы хотели бы сделать следующие предложения по созданию фотоэлементов.

Солнечные элементы или солнечные панели представляют собой полупроводниковые устройства на основе p-n перехода, генерирующие ток под действием света [3]. Кремний (Si) используется в качестве основного элемента солнечных элементов. На самом деле почти 97% электронных продуктов основаны на кремнии. Это вещество более распространено в природе и предпочтительнее других полупроводников из-за легкости извлечения. Наряду с кристаллическим кремнием в фотоэлементах широко используется и аморфный кремний. Стоимость солнечного элемента из аморфного кремния выше стоимости кристаллического кремния. При использовании аморфного кремния в качестве базового слоя целесообразно получить толщину 180 мкм.

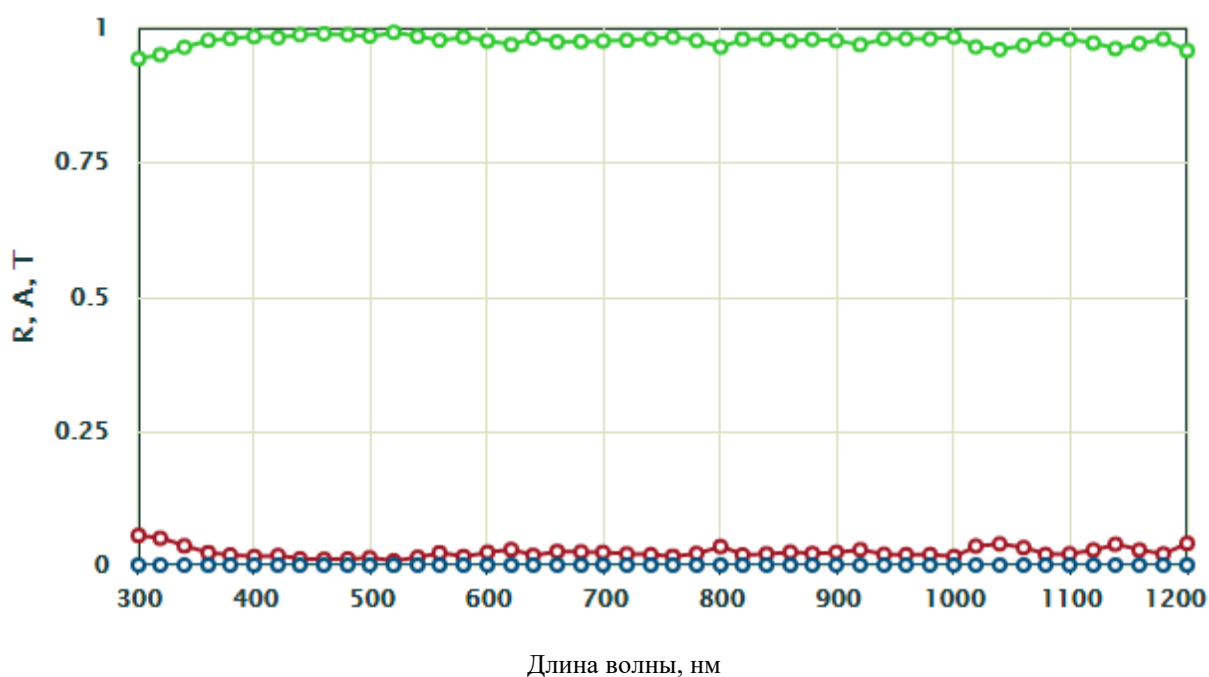
В солнечных элементах верхняя часть кремния покрыта оптическим слоем различных элементов. Считалось, что оптический слой играет важную роль в поглощении большей части солнечного

света и улучшении его оптических свойств. Толщина оптического слоя составляет нм. В настоящее время в качестве оптических слоев в фотоэлементах в основном используются ITO, ZNO, SiO, CZTSe, CIZT. Следует отметить, что процесс фотогенерации в исследуемом фотоэлементе с конверсией этих веществ во фторид лития (LiF) высок. Процесс фотогенерации заключается в образовании пар электронов и резонаторов. С другой стороны, электроны и полости действуют как носители заряда в фотоэлементе. Между кремнием и LiF возникает неоднородность. Запрещенные зоны равны по ширине, то есть электрические переходы на основе химически идентичных полупроводниковых

материалов называются гомеопатическими, а переходы на основе полупроводников с разными значениями зон - гетеропроводимости.

Поскольку LiF и кремний являются элементами с разной шириной полосы пропускания, между ними возникает неоднородность. LiF покрыт слоем кремния толщиной 75 нм. Это почти в тысячу раз меньше, чем базовый слой.

Если поверхность фотоэлементов выполнить в виде пирамид, то свет, падающий на пирамиду, ударится о стенки пирамиды и разобьется 4 раза, и каждый раз будет поглощаться 80% поглощенного света. тускнеть. Желательно, чтобы пирамиды были правильными и имели внутренний угол  $60^\circ$ .



Фигура 1. Изменение R, A, T в зависимости от длины волны  $\lambda$  получено в онлайн-программе *PVLightHouse*.

Здесь:

- R - коэффициент отражения света,
- A - коэффициент светопоглощения,
- T - коэффициент пропускания света.

Параметры, введенные с использованием приведенных выше предложений, теперь были протестированы в программе под названием *PVLightHouse*, которая представляет собой углубленное исследование свойств солнечных элементов. Как видно из графика, коэффициент светопоглощения фотоэлемента близок к 100%, а коэффициент светотражения очень низкий. Тот факт, что процесс фотогенерации составляет 97,73%, говорит о том, что этот фотоэлемент более эффективен, чем его предшественники.

Как видно из графика, полупроводниковый солнечный элемент на основе аморфного кремния с оптическим слоем LiF может быть дешевле, безопаснее и эффективнее, чем используемые в настоящее время солнечные панели.



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