

**ФАН ВА ТЕХНОЛОГИЯЛАР
ТАРАҚҚИЁТИ**
**РАЗВИТИЕ НАУКИ И
ТЕХНОЛОГИЙ**



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ФАН ВА ТЕХНОЛОГИЯЛАР ТАРАҚҚИЁТИ

ИЛМИЙ – ТЕХНИКАВИЙ ЖУРНАЛ

РАЗВИТИЕ НАУКИ И ТЕХНОЛОГИЙ

НАУЧНО – ТЕХНИЧЕСКИЙ ЖУРНАЛ

Журнал Ўзбекистон матбуот ва ахборот агентлиги Бухоро вилояти бошқармасида 2014 йил 22-сентябрда № 05-066-сонли гувоҳнома билан рўйхатга олинган

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МУНДАРИЖА - СОДЕРЖАНИЕ – CONTENT

ТЕХНИКА, ТЕХНОЛОГИЯ ВА ЖИҲОЗЛАР	
Бибутов Н.С., Хожиев А.Х., Ҳабибов Ф.Ю. Балкани эгилишга синаш	4
Ataullayev Sh.N., To'raqulova M.Q., Boboqulov F.B., Xamidov D.G'. Neft va gaz zavodlaridan chiqayotgan mash'ala gazlarini qayta ishlash texnologiyalasini takomillashtirish . . .	11
Xamzayev A.A., Xaydarov Sh.B., Usmonov M.Z., Niyetbaev A.D. Karyer bir cho'michli ekskavatorlarining ish rejimlarini optimallashtirish	18
Ismailov M.A., Mannobjonov B.Z. Suv tozalash jarayonida mikroorganizmlarga ta'sir qiluvchi asosiy faktorlar	24
Чулиев У.Х., Амонов М.Р. Разработка состава буровых растворов и изучение их реологических и эксплуатационных свойств	32
Sharibayev N.Y., Ibragimov A.T. Ipak salmog'ini oshirish uchun ipak qurtlarini parvarishlashning zamonaviy yechimlari	35
Мухамедбаев А.А. Влажностные характеристики автоклавного газобетона	39
Jo'rayev F.O'., Umedova U.X., Axmedov Y.H., Mardonova S.M. Plug osti tovonini yumshatadigan chuquryumshatkich qurilmasining murakkab sirtli ishchi organining dala tajriba tadqiqotlari natijalari.	45
КИМЁ ВА КИМЁВИЙ ТЕХНОЛОГИЯЛАР	
Фозилов С.Ф., Зоирова А.И., Фозилов Ҳ.С. Табиий газдан МТО (метанолдан олефин) технологияси асосида қуйи олефинар олиш	50
Atoyev E.X., Sharipova N.O'. Adgeziya xossalarini oxirgi plazmali mustahkamlash usulidan foydalanib o'rganish	57
Eshdavlatova G.E., Kamolov L.S. Tabiiy gazlarni nordon komponentlardan aminli tozalashda ko'piklanish sabablari va uning intensivligiga ta'sir etuvchi omillar	61
Умурова Ш.Ш., Амонов М.Р., Амонова М.М. Изучение текстурных характеристик бентонитовых материалов	64
Axmedova Sh.U., Axmedova O.B. Gazlarni absorbsion tozalashda samarali absorbent kompozitsiyalar yaratish	68
Ataqulova D.D. Neft-gaz-suv muhiti korroziyasida aminonitrilli (MAD tipli) ingibitorlarning samaradorligini o'rganish	72
Bobokulova M.Sh., Xodjamkulov S.Z. Effect of various factors on the synthesis of ion-exchange membranes and IR-spectral description of their structure with a fure converter . . .	78
To'raqulova M.Q., Boboqulov F.B., Temirov A.H. "Vodorod sulfidi saqlagan nordon gazlarni utilizatsiyalashning samarali texnologiyasini ishlab chiqish"	84
Abdukarimov M.M., Maxmudov N.N., Yodgorov N. Gazkondensat konlarini ishlatishni sa-maradorligini oshirishda organik aminlar asosidagi korroziya ingibitorining ta'sirini tadqiq etish	91
Abdukarimov M.M., Maxmudov N.N., Yodgorov N. Magistral neft va gaz quvurlarini vodorod sulfidli korroziyasiga ingibitorlarni ta'sirini tadqiq etish	95
Tursunova F.J., Amonov M.R. Sanoat katalizatorlari chiqindilarini qayta ishlash	99
Муҳиддинов Б.Ф., Джалилов А.Т., Исроилов О.И., Ширинов Ш.Д. Сравнительный анализ набухаемости гидрогелей синтезированных на основе карбоксиметилцеллюлозы	105
Choriyev A.U., Mirzayeva S.K., Normurodov I.O'., Izbasarova G.Sh. 4-xlorfenilxlor-atsetat asosida nukleofil almashinish reaksiyalarini tadqiq qilish.	110

МАШИНАСОЗЛИК ВА ЭНЕРГЕТИКА

Жалилов Р.Б., Караев А.Т., Камалов У.У. Исследование модернизации котельной АО «Бухараэнергомарказ»	117
Berdiev D.M., Abdullaev B.K., Abdullaev A.X., Kuziyev G.Sh. Yeyilishbardosh qoplama qoplash jarayonining termodinamik ko'rsatkichlarini hisoblash	125
Maxmudov M.I., Timirov X.N. Oqova suvda erigan kislorodni optik usulda o'lchashning afzalliklari	131
Muzaffarov F.F. Vertikal o'qli shamol energetik qurilmasining yurgizish momentini oshirishning ilmiy-texnik tadqiqoti	135
Mirzayev Sh.M., Hakimova S.Sh., Qodirov J.R. Qovunlarni quritishda quyosh radiatsiyasi va tabiiy vakuumli dastlabki ishlov berish	145
Makhmudov M.I., Mamirov U.F., Nurov S.S. Treatment plants increasing the energy efficiency of biological by automating measurements of main technological parameters	153
Tog'ayev I.B., Abdullayev Sh.Sh. Reaktiv quvvat manbalari yordamida elektr energiyasining sifat ko'rsatkichlarini bosqichma-bosqich oshirishda tizimli tahlil olib borish	156
Сафаров А.Б., Пиримов Р.Р., Сайфиддинов Қ.Э. Муқобил энергия манбаларидан электр энергиясини олишда кичик тезликли электр генераторни лойиҳалаш ва динамик режимларини моделлаштириш	164
Kamolov J.J. Panel-nurlanishli isitish tizimini turli izolyatsiya materiallari uchun hisoblash	174
Maxmudov M.I., Sayfiyev H.O., Nurov S.S. Fotoelektrik batareyalar energetik parameterlarini monitoring qilish uchun quyosh intensivligini kuzatish qurilmasi tayyorlash	178
Tovboyev A.N., Tog'ayev I.B. Reaktiv quvvat manbalarini o'rnatish natijasida elektr energiyasining sifat ko'rsatkichlarini oshirishning baholash usullari	183
Barakayev N.R., Narziyev M.S., Talabov M.D., Jo'raqulova M.O. Inkubatsiyalash jarayonida parranda tuxumlarini o'z o'qi atrofida aylantirish uchun sarflanadigan energiyani aniqlash .	191

ИНФОРМАТИКА ВА АХБОРОТ – КОММУНИКАЦИОН ТИЗИМЛАР

Жураев З.Б., Курбонов М.У., Абдувохидов Х.Ш. Современное состояние цифровой образовательной системы высшего образования в республике Узбекистан	196
Курбанов Ж.М., Курбанова М.Ж., Холтураев Х.К. Разработка математической модели изменения структурно-механических свойств плодов и овощей в процессе сушки.	201

ОЗИҚ-ОВҚАТ САНОАТИ ТЕХНОЛОГИЯЛАРИ

Sharipov N.Z. Olcha danagining fizik xossalarini tadqiq qilish	207
Sabirov U.K., Oqilov A. Sut mahsulotlarini saqlashning mikroiklim parametrlarini intellektual boshqarish tizimini ishlab chiqish	211
Oltiyev A.T., Haydarova M.F. Tsukat ishlab chiqarish texnologiyasidagi an'anaviy shakar xom ashyosini, novvot ishlab chiqarish texnologiyasining qoldiq siropiga almashtirish	220
Атамуратова Т.И., Ахмедова М.Б. Способы приготовления бездрожжевого хлеба . . .	225
Хаитов Р.А., Ахмедова М.Б. Применение муки из соевого жмыха для улучшения белкового состава хлеба	229
Рахмонов К.С., Атамуратова Т.И. Антибактерицидная активность настоев из пряно-ароматического растительного сырья	233
Эрматов О.С. Қишлоқ хўжалик маҳсулотларини қайта ишлаш миницеҳи.	240
Barakayev N.R., Uzoqov Y.A., Sadullayev S.X., Xolmuradov B.B., Axmedov A.G'. Respublikamizda ekilayotgan bug'doy don navlarini tahlil etish	247
Ибрагимов Р.Р., Нарзиев М.С., Кулдошева Ф.С., Шарипов Н.З. Разработка плана эксперимента процесса стерилизации плодов и овощей	252

ТЎҚИМАЧИЛИК ВА ЕНГИЛ САНОАТ ТЕХНОЛОГИЯЛАРИ

Muhammedova M.O. Boldir-tovon bo'g'imi shikastlangan oyoq panjalari uchun ortopedik poyabzal va ortezlarning konstruktiv tahlillari	259
Ataxanov A.K., Azizov I.R., Odilxonova N.O. Tiklangan tolalardan mexanik texnologiyada notoqima matolar tayyorlash imkoniyatlari	267
Muhammedova M.O. Boldir-tovon bo'g'imidagi shikastlanishlarda tadqiqotchilar tomonidan taklif etilgan ortopedik yechimlar tahlili.	272
Do'stova F.X. Tikuv mashinasining taklif etilgan friksion muftasi konstruksiyasi vazifasi va ish tamoyillari.	275
Мардонов С.Э. Определение уработки нитей ворсовой основы при формировании коврового изделия.	279
Бebuтова Н.Н. Ёзги махсус кийимларни тайёрлашда қўлланиладиган талабларни шакллантириш	284
Kurbanov F.A., Zarifova M.B. Jin arra tishlari ishchi yuzasiga ta'sir qiluvchi kuchlar	290
Хамроева М.Ф., Мухамеджанова С.Ф., Туйчиев Т.О. Турли конструкциядаги козиқчали-планкали барабанларнинг ифлосликларни ажралиш жараёнига таъсири . . .	293
Парпиев А., Наврузов Н., Ахмедов К., Якубов К. Ишчи камерадаги пахтанинг дастлабки оқим ҳаракати динамикаси.	299
Ibrohimov I., Obidov A. Takomillashtirilgan toshtutgich kamerasida harakatlanayotgan paxta bo'lakchasining shikastlanish holatini tadqiq qilish.	303
Хамроева М.Ф., Мухамеджанова С.Ф., Туйчиев Т.О. Турли конструкциядаги козиқчали-планкали барабанларнинг тозалаш самарадорлигига таъсири	310
Турдиев Б.Э., Росулов Р.Х., Райимкулов Ж.К., Пардаев Б.Ч. Пахта чигити элеваторида тасмали лентанинг тажрибавий изланишлари.	315
Жуманиязов Қ., Саломов А. Пневмомеханик йигирув жараёнини такомиллаштирилган самарали технологиясини ишлаб чиқаришга қаратилган илмий тадқиқот ишлари таҳлили	319
Muhammedova M.O., Barnoyev B.E. Xromlangan charm tarkibini tahlil qilish va charm chiqindilarini qayta ishlash usullari	328
АНИҚ ВА ИЖТИМОИЙ-ИҚТИСОДИЙ ФАНЛАР	
Мустақимова Қ.С. Александр Сергеевич Пушкин ва ўзбек адабиёти	333
Цай И.К. Непрерывное образование библиотечных специалистов Республики Узбекистан	336
Mirzayev Sh.R., Eshchanov Sh.A. Issiq-quruq iqlim sharoitida sanoat usullaridan foydalgan holda o'rta qavatli turar-joy binolarini loyihalashning tamoyillari: Buxoro shahri misolida	343
Xasanova S.Q. Fe'l nisbatlari tarjimai muammolari va yechimlari	348

EFFECT OF VARIOUS FACTORS ON THE SYNTHESIS OF ION-EXCHANGE MEMBRANES AND IR-SPECTRAL DESCRIPTION OF THEIR STRUCTURE WITH A FURE CONVERTER

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Abstract. In this work, the results of the research of complexes with divalent salts of copper, mercury and lead based on the reaction products of dimethylolthiourea and dimethylolurea with polyethylene terephthalate and orthophosphate were reviewed and analyzed. Based on the reaction products of dimethylolthiourea and dimethylurea with polyethylene terephthalate and orthophosphate of a new composition, complexes with divalent salts of copper, mercury and lead were obtained and research results were analyzed.

Key words: dimethylsulfoxide (DMSO), dimethylformamide (DMFA), static exchange volume (SEV), composite based on dimethylolurea and ammonium phosphate (UFA-1)

ФУРЬЕ-ПРЕОБРАЗОВАНИЕ ИК-СПЕКТРАЛЬНОЕ ОПИСАНИЕ ДЕЙСТВИЯ РАЗЛИЧНЫХ ФАКТОРОВ И ИХ СТРУКТУРЫ ПРИ СИНТЕЗЕ ИОНООБМЕННЫХ МЕМБРАН

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Аннотация. В данной работе рассмотрены и проанализированы результаты исследования комплексов с двухвалентными солями меди, ртути и свинца на основе продуктов реакции диметилполтиомочевины и диметилполмочевины с полиэтилентерефталатом и ортофосфатом. На основе продуктов реакции диметилполтиомочевины и диметилмочевины с полиэтилентерефталатом и ортофосфатом нового состава получены комплексы с двухвалентными солями меди, ртути и свинца и проанализированы результаты исследований.

Ключевые слова: диметилсульфоксид (ДМСО), диметилформамид (ДМФА), статический обменный объем (СОО), композит на основе диметилмочевины и фосфата аммония (МФА-1).

IONALMASHINUVCHI MEMBRANALAR SINTEZ QILISHDA TURLI OMILLAR TA'SIRI VA ULAR TUZILISHINING FURYE QAYTA O'ZGARTGICHLI IQ-SPEKTRAL TAVSIFI

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Annotatsiya. Bu ishda dimetiloltiokarbamid va dimetilokarbamidning polietilentereftalat va ortofosfat bilan reaksiya mahsulotlari asosida mis, simob va qo'rg'oshinning ikki valentli tuzlari bilan komplekslarni tadqiq qilish natijalari ko'rib chiqildi. Dimetiloltiokarbamid va dimetiluriyaning yangi tarkibdagi polietilentereftalat va ortofosfat bilan reaksiya mahsulotlari asosida mis, simob va qo'rg'oshinning ikki valentli tuzlari bilan komplekslar olindi va tadqiqot natijalari tahlil qilindi.

Kalit so'zlar: dimetilsulfoksid (DMSO), dimetilformamid (DMFA), statik almashinuv hajmi (SAH), dimetilolkarbamid va ammoniy fosfat (KFA-1) asosidagi kompozitsion membrana.

Introduction. Physico-chemical methods (membrane, electrochemical, etc.) play a major role in the protection of water resources and their rational use. This allows to improve the quality of water and to treat wastewater. The repeated use of water resources in technological processes leads to the saving of fresh water and the reduction of waste water. The use of multifunctional highly resistant ionites and membranes in this field allows production of import-substituting ionites and membranes in waste-free technologies, softening of mineral waters and industrial wastewater, as well as extraction of gold and other metals from industrial waste. Many scientists have synthesized polymeric materials with ionizable properties based on diglycidyl derivatives [Turayev et al., 2013].

The term "membrane" is translated from the Latin language and means bark, shell, and was first used in France in 1748 by Abbot Nolle in the purification of water-alcohol mixture. In 1890, the German physicist and chemist V.F. The system of electromembranes was founded by Ostwald and the theory of the membrane potential between the membrane and the solution was founded. But it was not until the 50s of the 20th century that the synthesis of ion-carrying polymer membranes in electrochemistry was widely developed [Laskorin et al., 1961].

Consists in obtaining and analyzing the research results of complexes with divalent salts of copper, mercury and lead based on the products of reaction of dimethylolthiourea and dimethylolurea with polyethylene terephthalate and orthophosphate with a new composition. IR-spectroscopy method was used to obtain information about the structure and properties of the obtained complexes.

Experimental part. Amide polymers synthesized on the basis of self-polymerization of dimethylolthiourea and dimethylolurea with orthophosphoric acid and polyethylene terephthalate contain electron-donating atoms - oxygen, nitrogen, phosphorus, which can form internal molecular compounds with mercury (II). The synthesized membranes have the appearance of a thin film, are insoluble in solvents, and dissolve in certain amounts in water, ethanol, DMFA and DMSO. The resulting membrane was thermally processed. The thermal stability of the membrane was determined by the method of differential thermal analysis. In order to study the physico-chemical, physico-mechanical and sorption properties of the synthesized membrane, they were transferred to the active OH⁻ form.

High molecular weight products of dimethylolthiourea and dimethylolurea synthesized by themselves with orthophosphoric acid and polyethylene terephthalate have been found to have high exchange and complex formation properties when they are transferred to the OH⁻ form in an aqueous solution of sodium hydroxide. Complex compounds are formed faster in the medium of methyl alcohol than in other solvents (ethanol, water). The resulting product complexes have sufficient thermal stability.

The IR-spectroscopy method was used to obtain information about the structure and properties of the obtained product complexes. The bond strength between the metal and various ligands was studied. The absorption lines of C = O - and - C - H - bonds in the IR spectra of the polymer of dimethylolurea itself with polyethylene terephthalate and orthophosphoric acid were observed in the region of 1600 cm⁻¹ and 1400 cm⁻¹, respectively. [Figs1,2].

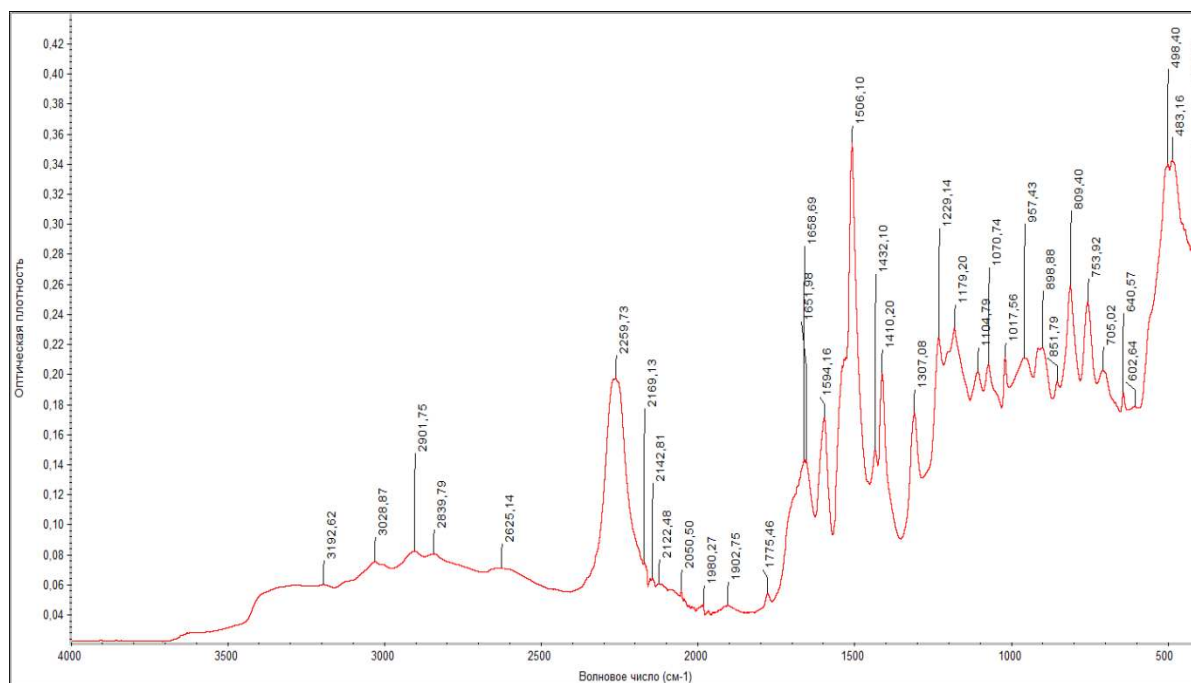


Fig.1. IR-spectrum of the membrane based on dimethylolurea and polyethylene terephthalate

The line at 1600 cm⁻¹ shifts to the high-frequency region of 20-40 cm⁻¹ in complex compounds of dimethylolcarbamide itself with polyethylene terephthalate, orthophosphoric acid, and the mercury (II) salt of the polymer. C = O valence vibration frequency bond increases due to the formation of C = O → Me⁺² [Figs 3,4]

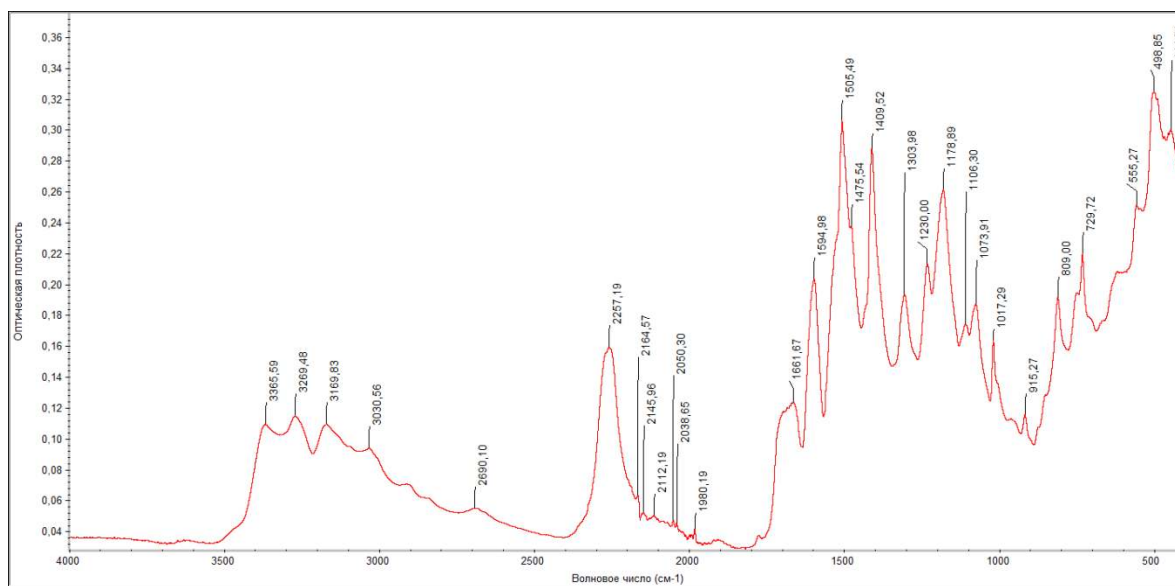


Fig. 2. IR-spectrum of the membrane based on dimethylolurea and orthophosphoric acid

It follows that the ability of the metal ion to form a complex is determined by the magnitude of the shift of the characteristic absorption line of the polymer ligand. The change in the vibrational frequency of the C – H group indicates the formation of the O → Me bond, which involves p - and d - electronic orbitals.

The exchange capacity of the membrane and its exchange volume depend on the nature of all the active groups identified in the membrane. If the exchange takes place only in the counterion part during the experiment or production process, then we are talking about the working volume of the membrane. This value depends on pH and the filtration rate of the solution through the membrane layer, the size of the membrane particles, the ion exchange columns, the electrolyte concentration and temperature, the nature of the ion exchange and the solvent.

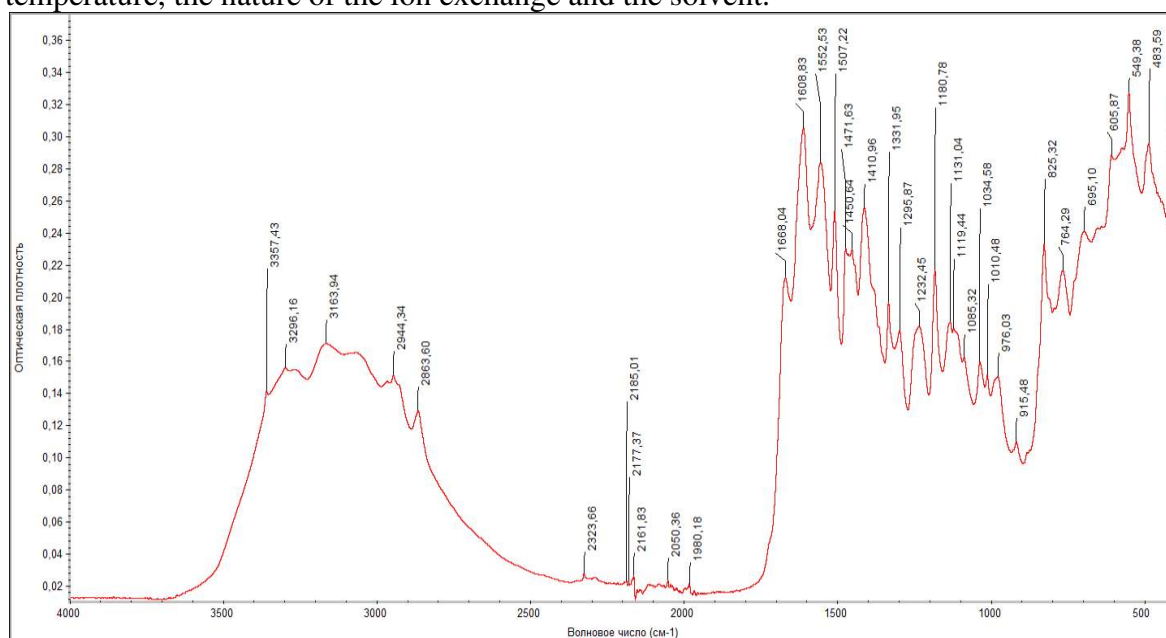


Fig. 3. IR-spectrum of the complex connection of the membrane based on dimethylolurea and polyethylene terephthalate with mercury (II) ion

In the course of the research, an aliquot of the filtrate was prepared after the equilibrium was established by adding the membrane in the form of OH⁻ to the neutral salt solution in the determination of the static exchange volume (SEV). It is possible to find a full exchange rate only in static conditions. When a solution of reagents is used in the exchange, the opposite ions bound to

the given membrane form a less dissociable compound, and this reaction goes to the end. Strong alkalis are used as reagents.

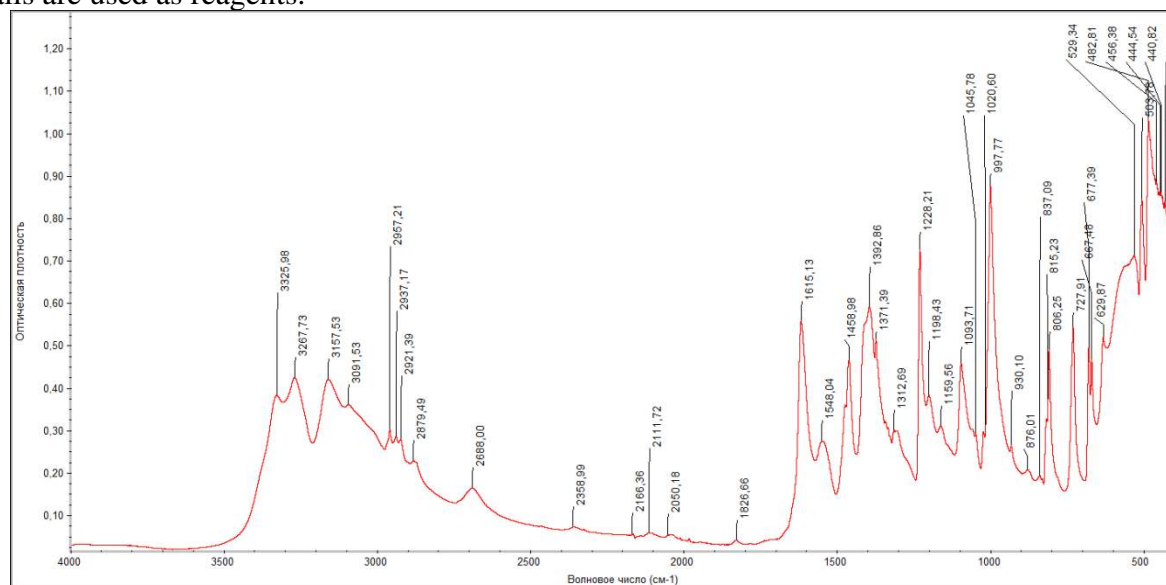


Fig.4. IR-spectrum of the complex combination of the membrane based on dimethylolurea and orthophosphoric acid with mercury (II) ion

During the sorption process, membranes were immersed in 0.1 N NaOH solution for 2 days and transferred to OH⁻ form. After that, the membranes were cut into pieces with a diameter of 10 mm and a length of 25 cm, and a solution of CuCl₂, HgSO₄, and PbSO₄ salts of 0.1 N was passed through the membrane surface at a rate of 2 ml/m. As a result of the inspection, it was found that the membrane was saturated with ions for 2 hours. The following formula was used for this:

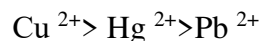
$$CE = \frac{(C_0 - C_p) \cdot V}{g}$$

Here, CE is the amount of metal ion absorbed in a given membrane, mmol/g;

C₀, C_p — concentration of metal ion solution before and after sorption in mmol/dm³;

V- solution volume, ml; g- membrane weight, g.

The table below shows that the membranes have a good exchange rate. This is of interest in studying the kinetic properties of membranes. Sorption of 0.1 normal solutions of copper mercury and lead on membranes was studied. Synthesized membranes well sorb passing metal ions. The studied ions can be placed in the following series according to the degree of sorption on the membrane:



In order to find the field of application of the synthesized membranes, the sorption properties of these polymers were studied in detail and they were compared with many ionomers.

Result and discussion. The sorption kinetics of copper ion in the synthesized membrane was studied in its 0.1 N sulfate solution. For this, the change of copper sorption over time was determined. It was found that the membrane obtained on the basis of dimethylolurea and orthophosphoric acid has the property of high sorption of copper ion. (Fig5)

In addition, the resulting membrane has good sorption properties for many other metal ions. It is also selective for heavy organic compounds and some precious metals.

A new ion-carrying membrane was synthesized based on dimethylolurea and orthophosphoric acid. During the sorption process, membranes were immersed in 0.1 N NaOH solution for 2 days and transferred to OH⁻ form.

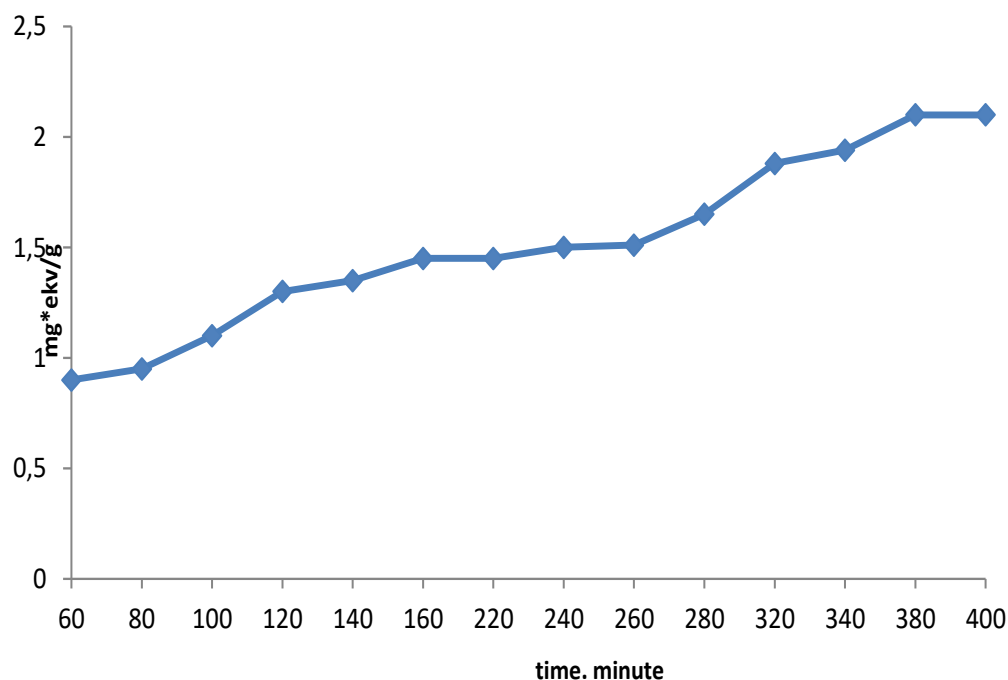


Fig. 5. Volume of dynamic exchange of Cu^{2+} ion per unit of time.

IR-spectra of the ion-carrying membrane based on dimethylolurea and ammonium phosphate were recorded in the range from cm^{-1} to 3502 cm^{-1} . In this case, the vibrations between 610 cm^{-1} and 720 cm^{-1} correspond to the C-O bond. Between 720 cm^{-1} and 760 cm^{-1} (CH_2)_x group vibrations are recorded. Vibrations recorded at $1010\text{-}1065 \text{ cm}^{-1}$ indicate that CH_2 groups can form cycles in the membrane. CH_2 groups were recorded in the range $1410\text{-}1480 \text{ cm}^{-1}$. The observation of deformation flat vibration characteristic for secondary amines in the range $1580\text{-}1640 \text{ cm}^{-1}$ indicates the presence of -NH- group. Valence vibrations at $3450\text{-}3600 \text{ cm}^{-1}$ are also characteristic of primary amines, which also indicate the presence of NH group in the membrane [Fig5].

Table 1. IR-spectra of UFAP-1 membrane and complexes formed by its sorption

Compound	ν (NH)	δ (NH)	ν (CH_2)	δ (CH_2)	Me-H	Me-O
UFAP-1	3320	1601	1105	1454	-	-
[CuL ₂] SO_4	3310	1643	1010	1410	-	457
[NiL ₂] SO_4	3360	1640	1090	1415	409	485
[CoL ₂] SO_4	3305	1640	1085	1405	428	476
[ZnL ₂] SO_4	3345	1640	1074	1425	415	488
[CrL ₃] Cl_3	3364	1640	1074	1435	422	485

In the synthesized complex compounds, the Cu-H bond at 422 cm^{-1} , Cr-H bond at 422 cm^{-1} , Zn-H at 419 cm^{-1} , Ni-H at 409 cm^{-1} and Co-H at 422 cm^{-1} are recorded. This can also be seen in the decrease of the absorption region of the secondary amino-group valence vibrations appearing in the region of 3360 cm^{-1} . In this case, the absorption area of the amino group is 3340 cm^{-1} , chromium is 3281 cm^{-1} , zinc complex is 3357 cm^{-1} , nickel complex is 3348 cm^{-1} , and cobalt is 3350 cm^{-1} decrease was noted. Absorption areas characteristic of the Me-O bond in the range of $457\text{-}482 \text{ cm}^{-1}$ were observed in complexes with metal sulfate sorption (Table 1, Figure 6).

Analysis of the IR-spectrum of UFA-1 ionite modified with Khovdak bentonite showed that new absorption spectra at 1298 cm^{-1} (R=O bond) and 2120 cm^{-1} (-OH bond of R-(OH)) appear in it. After coordination, it was noted that the absorption frequency of the R=O bond decreased by $8\text{-}26 \text{ cm}^{-1}$, and the valence vibrations of -OH and secondary amino groups increased by $7\text{-}42 \text{ cm}^{-1}$ and $23\text{-}115 \text{ cm}^{-1}$, respectively. From this we can say that the coordination went through the oxygen atom of the R=O bond (Table 2, Figure 7.)

Table 2. IR-spectra of UFAP-1-B ionite and its complexes formed by sorption

Compound	ν (NH)	ν (P=O)	ν (CH ₂)	δ (CH ₂)	Me-H	Me-O
UFAP-1-B	3295	1290	1076	1448	-	-
[CuL ₂]SO ₄	3293	1285	1078	1450	-	465
[NiL ₂]SO ₄	3289	1293	1074	1452	412	466
[CoL ₂]SO ₄	3294	1295	1072	1448	409	455
[ZnL ₂]SO ₄	3298	1296	1072	1450	411	462
[CrL ₃]Cl ₃	3285	1298	1070	1454	408	481

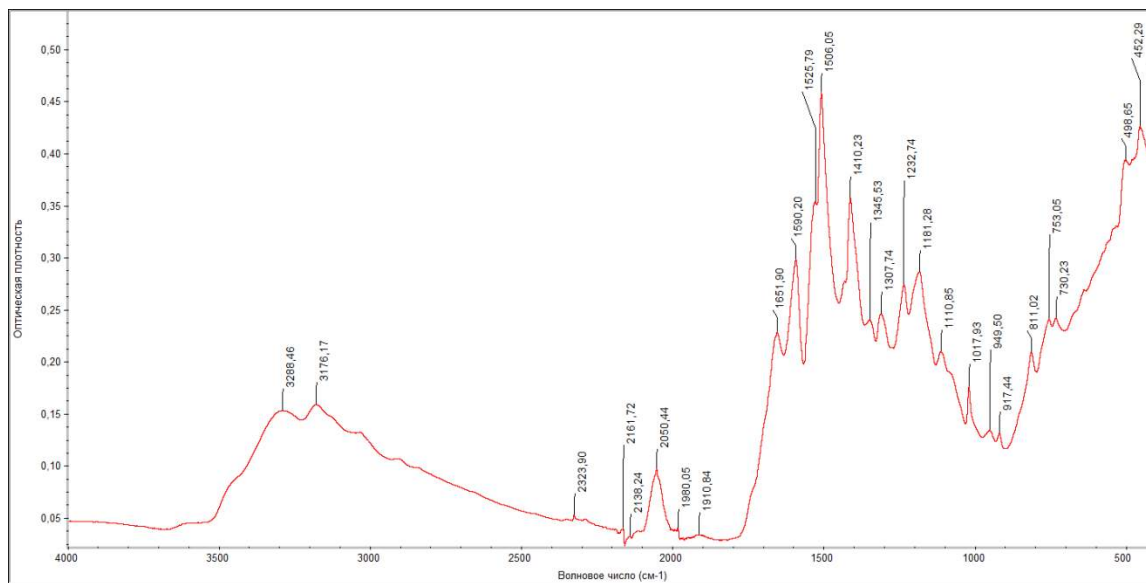


Fig.6. IR spectrum of Cu(II) ion absorbed by ionite

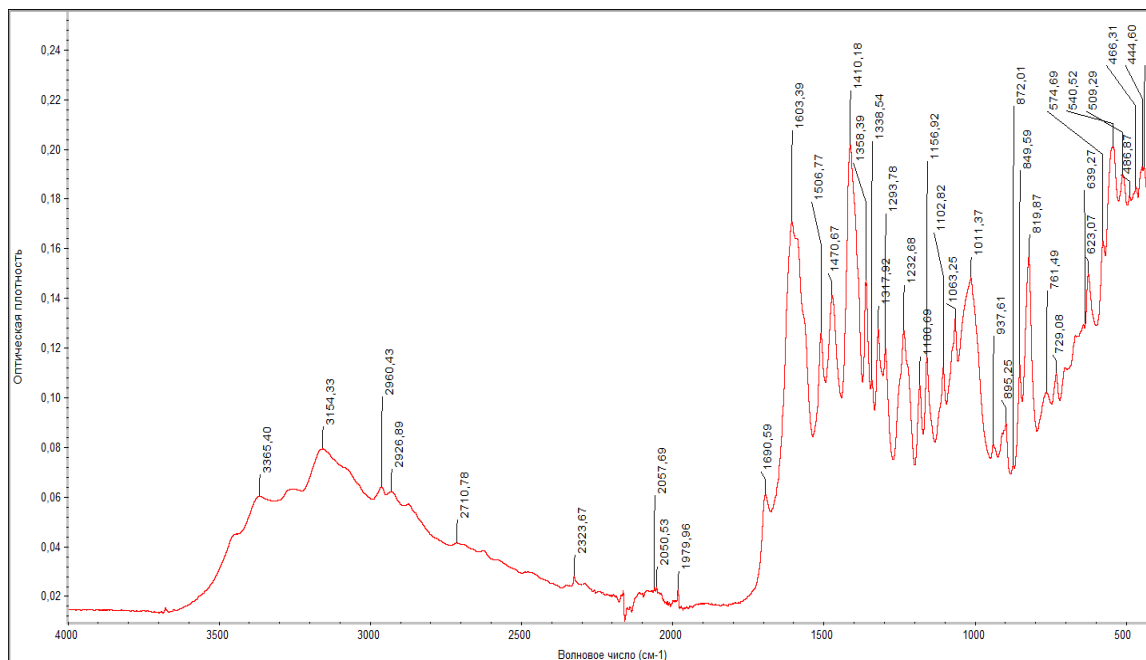


Fig.7. IR spectrum of Co(II) ion absorbed by ionite

Conclusion. It was found that the ion-carrying membrane obtained on the basis of dimethylolurea and orthophosphoric acid has the property of high sorption of copper ion. According to the results of the obtained IR-spectra, CH₂ groups can form a cycle in the structure of the

membrane. The observation of a characteristic deformation plane vibration for secondary amines indicates the presence of a -NH- group.

References.

1. Boymatov I.M., Eshmetov I.D., Muminov S.Z. (2020) Adsorption of benzene vapor on adsorbents based on Navbahor alkaline bentonite and Angren coal // Scientific-technical and practical magazine "Composite materials" № 2. 27-31 p.
2. Eshkurbonov F.B. (2013) Obtaining ion exchangers based on the reaction of interaction of thiourea, epichlorohydrin and various amines// Uzbek chemical journal № 5. 27-30 p.
3. Laskorin B. N.(1961) Ion-exchange membranes and their application Gosatomizdat, 288 p
4. Turaev Kh.Kh., Jalilov A.T., Eshkurbonov F.B., Kasimov Sh.A. (2013) Synthesis and properties of ion-exchange resins // Uzbek chemical journal № 1. 10-13 p.
5. Zubakova L.B., Tevlina A.S., Davankov A.B.(1978) Synthetic ion exchange materials//Chemistry, - 225 p.

VODOROD SULFIDI SAQLAGAN NORDON GAZLARNI UTILIZATSIYALASHNING SAMARALI TEXNOLOGIYASINI ISHLAB CHIQISH

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Annotatsiya. Maqolada ekologiyaga chiqarilib, ya'nikim yondirib yuboriladigan mash'ala gazlar tarkibidagi zaharli nordon gazlarni ushlab qolib, havo tarkibini inson, qolaversa, tabiat uchun tozalash muhokama qilingan. Binobarin, gazlarni qayta ishlash zavodlarida vodorod sulfidi saqlagan nordon gazlarni utilizatsiyalashning samarali texnologiyasini ishlab chiqish masalasi dolzarb hisoblanib kelmoqda.

Kalit so'zlar: vodorod sulfid, utilizatsiya, nordon gaz, absorbsiya, mash'ala, karbonat angidrid, xemosorbsiya, konsentratsiya, komponent.

DEVELOPMENT OF EFFECTIVE TECHNOLOGY OF UTILIZATION OF SOUR GASES CONTAINING HYDROGEN SULFIDE

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Annotation. In the discussion of this research work, it serves to clean the air composition for the sake of humans and nature by trapping the toxic and sour gases contained in the torch gases that are released into the environment and burned. Therefore, it is considered urgent to consider the issue of developing an effective technology for disposal of sour gases containing hydrogen sulfide in gas processing plants.

Key words: hydrogen sulfide, disposal, sour gas, absorption, torch, carbon dioxide, chemosorption, concentration, component.

РАЗРАБОТКА ЭФФЕКТИВНОЙ ТЕХНОЛОГИИ УТИЛИЗАЦИИ СЕРИСТЫХ ГАЗОВ, СОДЕРЖАЩИХ СЕРОВОДОРОД

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Аннотация. При обсуждении этой исследовательской работы он служит для очистки состава воздуха ради людей и природы путем улавливания токсичных и кислых газов, содержащихся в факельных газах, которые выбрасываются в окружающую среду и сжигаются. Поэтому представляется актуальным рассмотрение вопроса разработки эффективной технологии утилизации высокосернистых газов, содержащих сероводород, на газоперерабатывающих заводах.

Ключевые слова: сероводород, утилизация, высокосернистый газ, абсорбция, факел, диоксид углерода, хемосорбция, концентрация, компонент.

Kirish. Bugungi kunda kimyo va gaz-kimyo sanoati texnologik tashlama gazlarining antropogen ta'sirini kamaytirish, muayyan ifloslantiruvchi moddalardan tozalab, texnologik jarayonlarda qayta foydalanish innovatsion texnologiyalarni qo'llashga bog'liq. Shu bilan birga