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Issue Article

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

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

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

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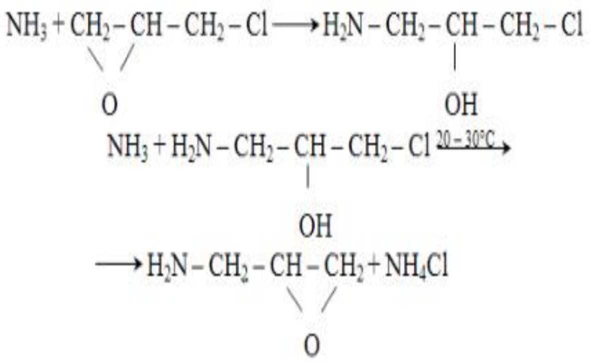
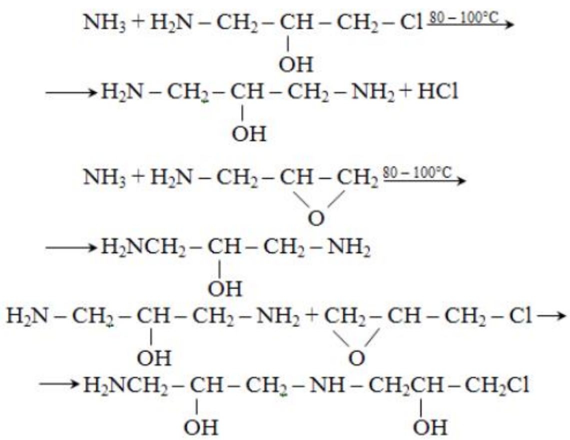
Introduction

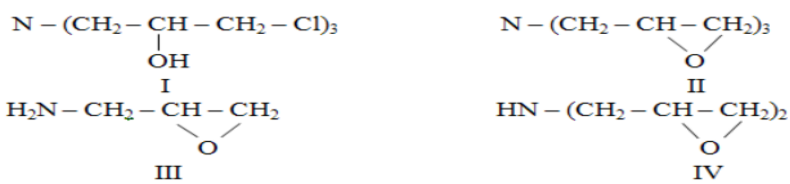
In addition to the enrichment of metals, it is important to use membranes obtained mainly on the basis of ion exchangers in the separation of secondary metals, which are separated as waste. It is also important to protect and use water resources wisely.In addition to improving water quality, physicochemical methods, such as membrane, electrochemical, etc., eliminate drainage, which allows the reuse of water in technological processes. The reuse of water in the process allows for the reduction of fresh water consumption, the return of contaminated water to the production of valuable components lost as a result of discharge and previous drainage. The use of multifunctional high-capacity ion exchangers and membranes allows to solve the current problems of import substitution in the development of waste-free sorption technologies and treatment of industrial effluents, as well as the extraction of additional metals from gold ions. The development and improvement of the Republic of Uzbekistan requires the use of new local products in hydrometallurgy, food, pharmaceuticals and other fields. Isolation of rare-earth metal ions in low-grade ores from membranes with high physicochemical, sorption sorbents allows to solve problems related to environmental protection and optimization of use of natural resources. At the same time, the demand for modern competitive technological lines based on the use of ion exchange materials and reusable materials is high. Thus, the production of membranes that can bind new sorbents with high sorption capacity, as well as the study of their physicochemical properties is a current and promising area of modern chemical technology and ecology.We will focus on the properties and production methods of epichlorohydrin, which is widely used in ion exchange and membrane synthesis. Epichlorohydrin has a higher selectivity than nitrogen compounds, so nitrogen-containing epoxy monomers and polymers are used in various fields of chemical production. Epichlorohydrin reacts with ammonia at room temperature according to the following scheme:



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

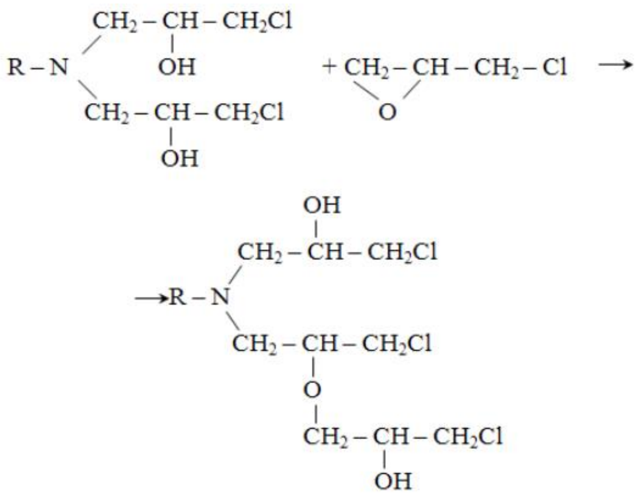


An excess amount of epichlorohydrin in the reaction leads to the formation of the following products.

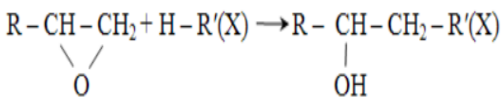


I II III IV

Specificity of the reaction The probability of formation of triglycidylamine (II) is high. Triglycydilamine is then crystallized with sopelemers at 45–46 °C and can be purified by distillation because it does not polymerize. 1-amino-2,3-epoxypropane (III) and diglycydilamine (IV) contain two active groups capable of interacting to obtain a water-soluble polymer. The hydroxyl groups obtained in the reaction system interact with the residual epoxy groups.



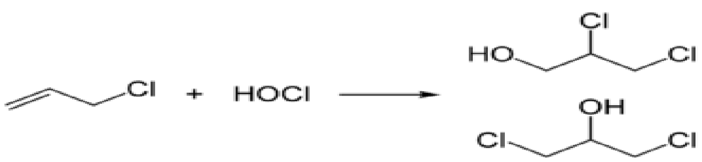
It can be concluded that if the primary monomers are oriented relative to each other, the nucleophilic agent is attached to the more hydrogenated carbon atom:



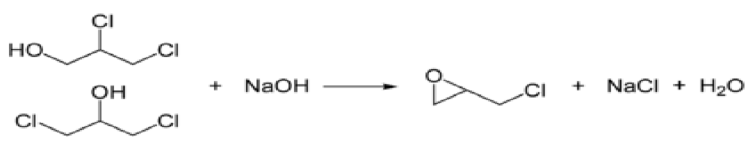
Other possible directions of the reaction may vary depending on the acidity or basicity of the reaction. The following reactions show that membranes can be synthesized by binding ion exchangers to amino groups in epichlorohydrin.The obtained substances can be made resistant to external influences and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

$$CH_3CH{=}CH_2 + Cl_2 \rightarrow ClCH_2CH{=}CH_2 + HCl$$

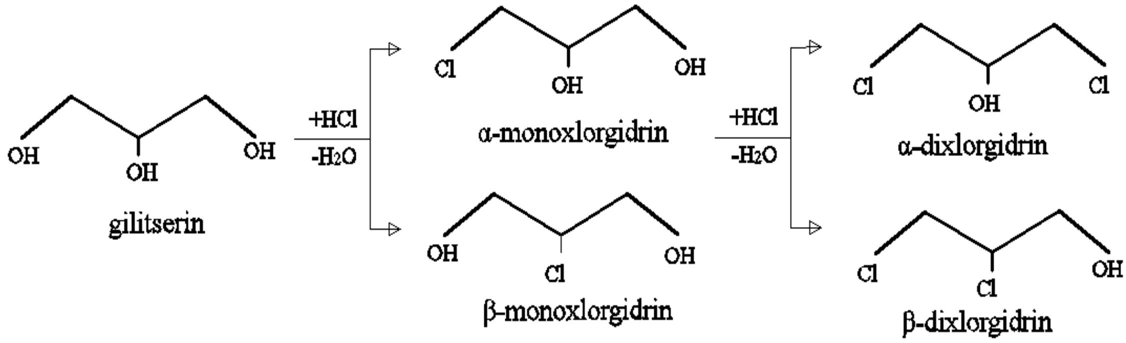
Allyl chloride is then reacted with hypochloric acid and isomeric dichlorohydrins of glycerin are obtained:



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



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



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

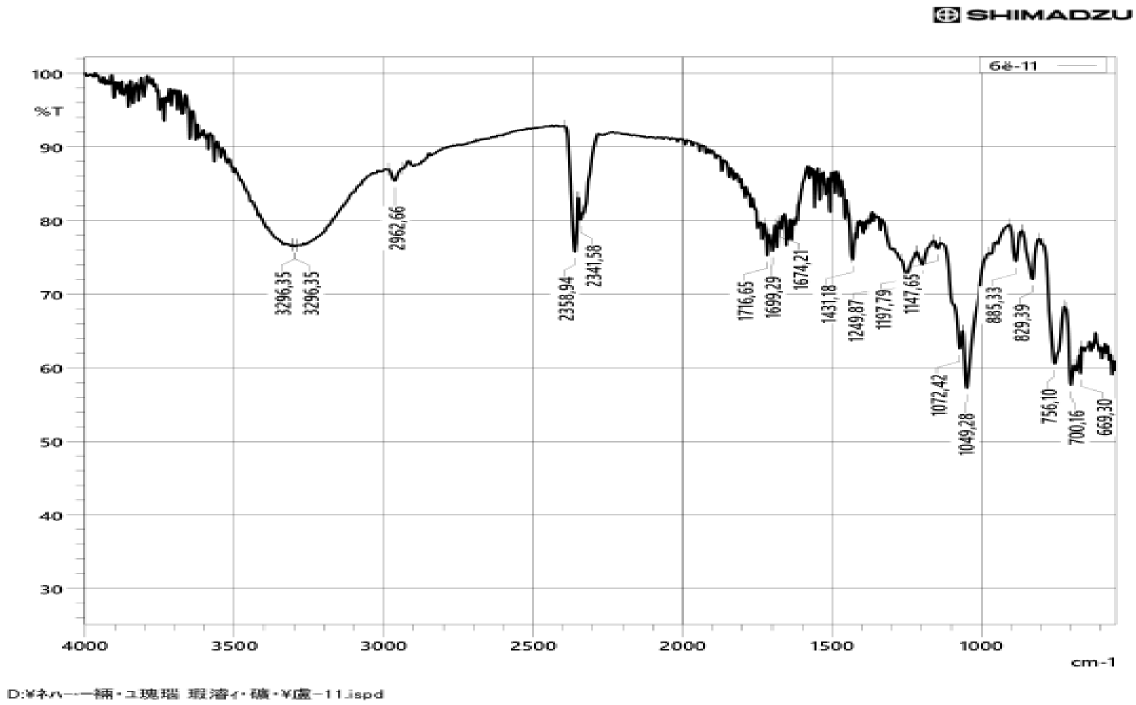


Figure 1. **IK spectrum of α-monochlorohydrin, β monochlorohydrin, α-dichlorohydrin, β dichlorohydrin formed by combining HCl gas with glycerol.**

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

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