SYNTHESIS OF THIOCL OLIGOMERS BASED ON LOCAL RAW MATERIALS AND THEIR MODIFICATION WITH UNSATURATED COMPOUNDS

Zoirova Husnora Sakhomiddin kizi
Master's student at Termez State University
Normurodov Bakhtiyor Abdullayevich
Professor of Termez State University

Abstract. The synthesis of thiocol oligomers based on local raw materials and their modification with unsaturated compounds belongs to the field of chemistry and materials science, and includes the processing of thiocol oligomers, raw materials and their modification with unsaturated compounds. These processes are an important way to produce environmentally friendly and economically efficient materials.
Key words. Thiocol, polysulfide, acrylate, methacrylate, crosslinking, basalt, dolerite, oceanite, platobasalt.
Аннотация. Синтез тиоколовых олигомеров на основе местного сырья и их модификация непредельными соединениями относится к области химии и материаловедения и включает переработку тиоколовых олигомеров, сырья и их модификацию непредельными соединениями. Эти процессы являются важным способом получения экологически чистых и экономически эффективных материалов.
Ключевые слова. Тиокол, полисульфид, акрилат, метакрилат, сшивка, базальт, долерит, океанит, платобазальт.

INTRODUCTION

Thiocol oligomers are organic compounds, often referred to as polysulfides or thioxoolefins. They are usually present as oligonucleotides or oligomeric polymers and contain thiol groups. The following steps can be used in the synthesis of thiocol oligomers:

- Starting materials: Various starting materials, such as sulfides, thiol acids, or other organic compounds, are used for the synthesis of thiocol oligomers.
- Synthesis process: This process is usually carried out by condensation reactions, polymerization, or other chemical methods. Thiocol oligomers are often obtained by the reaction of thiol groups during polymerization.

Basalt is an igneous rock with a gray to black color and a specific gravity of 2.5-3. It consists mainly of plagioclase; it also contains pyroxenes, olivine, and magnetite, titanite, apatite, etc. Its chemical composition is close to its deep-seated analogue, gabbro. Volcanic glass fills the spaces between the granular crystals. Fully crystallized basalts are called dolerite. The type of basalt that formed on the ocean floor and is rich in iron and magnesium is called oceanite, while the type that has flowed onto land through tectonic faults and solidified is called plateau basalt. Basalt occupies a very large area on the ocean floor and on land. Basalt lavas also flow from modern volcanoes. Depending on the mineral content, they are called analcitic basalt, leucite basalt, nepheline basalt, magnetite basalt, haiwinite basalt, apatite basalt, etc. Basalt is used in the manufacture of acid-resistant chemical devices, pipes, electrical insulators, in the production of cast stone products, and as a decorative coating material in construction. Due to its good polishability, it has been used in sculpture since ancient times in Egypt, Assyria, Rome, Byzantium, Armenia, and other places. It is found in Kamchatka, Transbaikalia, Armenia, Ukraine, and the Kurama, Turkestan, and Tomdi mountains of Uzbekistan.

LITERATURE ANALYSIS AND METHODOLOGY

Synthesis of thiocol oligomers based on sodium tetrasulfide, monochlorohydrin and urea adducts. (MKA-1) In a 500 ml three-necked flask equipped with an automated mixer, reflux condenser, thermometer and additional funnel, 31.5 g (0.40 mol) of sodium sulfide is dissolved in 150 ml of water. 37.5 g (1.17 mol) of sulfur is added to the solution, the mixture is heated and stirred with a stirrer for 1 hour. Then the solution is filtered and 0.22 g (0.0013 mol) of ionic liquid (tetraethylammonium chloride) is added. To this solution, 33.2 g (0.30 mol) of monochlorohydrin is stirred at 700 °C for 1 hour. Then 0.3 g (0.0013 mol) of urea adduct is added and the reaction mixture is kept at 80 °C for another 1 hour. After that, the mixture is cooled. The resulting light yellow gummy product is washed three times with warm water. Then it is dried in a fume hood. The product obtained is 62 g (94% of theory). Sulfur content is 37.4%.)

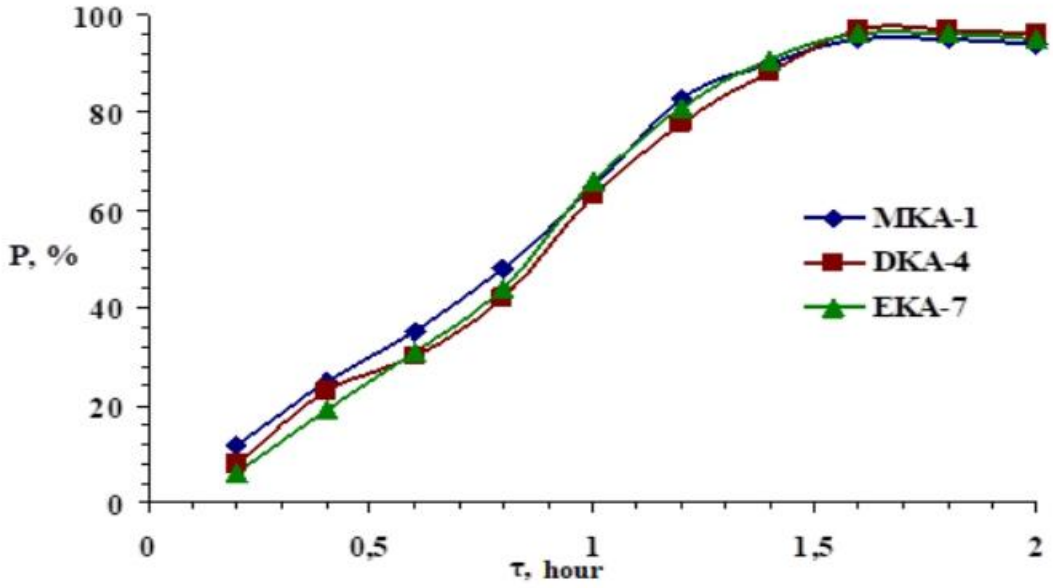
Synthesis of polysulfide oligomers based on sodium tetrasulfide, dichlorohydrin and urea adducts. DKA-4

In a 500 ml three-necked flask equipped with a stirrer, reflux condenser, thermometer and additional funnel, 31.5 g (0.40 mol) of sodium sulfide is dissolved in 150 ml of water. 37.5 g (1.17 mol) of sulfur is added to the solution, the mixture is boiled with stirring for 1 hour. Then the solution is filtered and 0.22 g (0.0013 mol) of ionic liquid (tetraethylammonium chloride) is added. To this solution, 38.7 g (0.30 mol) of dichlorohydrin is poured into it at 65-70°C with stirring for 1 hour. Then 0.3 g (0.0013

mol) of urea is added and the reaction mixture is heated at 80-85°C for another 1 hour. After that, the mixture is cooled. The resulting pale yellow viscous mass is washed three to four times with warm distilled water and dried in a fume hood. Obtain 62 g of oligomer (96% theoretical). The sulfur content is 55.1%.

RESULTS. Synthesis of thiocol oligomers based on sodium tetrasulfide, epichlorohydrin and urea adducts. EKA-7 In a 500 ml three-necked flask equipped with a stirrer, reflux condenser, thermometer and additional funnel, 31.5 g (0.40 mol) of sodium sulfide is dissolved in 150 ml of water. 37.5 g (1.17 mol) of sulfur is added to the solution, the resulting mixture is boiled for 1 hour with stirring. Then the solution is filtered and 0.22 g (0.0013 mol) of ionic liquid (tetraethylammonium chloride) is added. To this solution, 27.8 g (0.30 mol) of epichlorohydrin is poured into it with stirring at 700C for 1 hour. Then 0.3 g (0.0013 mol) of urea adduct is added and the reaction mixture is kept at 800C for another 1 hour. The resulting dark brown viscous mass is washed three times with boiling water and dried in a fume hood. The resulting product is 67g. (93% theoretical). The sulfur content is 55.2%.

Synthesis of polysulfide oligomers with sodium tetrasulfide, monochlorohydrin and metal-containing adducts. (MMA-2) A 500 ml three-necked flask is equipped with a stirring rod, a reflux condenser, a thermometer and a dropping funnel. Initially, 31.5 g (0.40 mol) of sodium sulfide is placed in the flask and dissolved in 150 ml of water. 37.5 g (1.17 mol) of sulfur is added to the solution and the mixture is heated at 800 C for 1 hour with stirring. After that, 0.22 g (0.0013



mol) of ionic solution of tetraethylammonium chloride is added to the mixture.

Time dependence of polysulfide oligomer reaction yield at 80°C

The dependence of the reaction yield on time during the synthesis of polysulfide oligomers was studied at a temperature of 80°C. When the reaction time was two hours, the reaction oligomer was obtained in high yield.

CONCLUSION

The synthesis of thiocol oligomers and their modification with unsaturated compounds is an important method for creating new, highly effective materials. These processes can be used to develop environmentally friendly and energy-efficient technologies. Materials produced from local raw materials can be economically viable and suitable for long-term use.

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