INVESTIGATION OF THE INTERACTION OF DICYCLOPENTADIENE WITH PERFLUOROPELARGONIC ACID

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Dicyclopentadiene (DCPD) is a byproduct of petroleum pyrolysis. DCPD can be used in polymer production for example for creating special weather and UV-light paint additives, resins and ither chemical synthesis products [1, 2]. It became possible because its conjugate structure which contains two double bonds and because of that DCPD can create two active centers which can attach different types of radicals.

DCPD has two types of isomers endo- and exo-isomers due to their different structure, they have different reactivity [3]. Endo isomer because of its coordination has slower reaction speed than exo-isomer. But endo-DCPD when polymderized creates highly crystalline polymers while exo-DCPD polymers creates amorphous structured polymers but with significantly higher yield than endo-DCPD.

Products based on polydicyclopentadiene (PDCPD) are very useful material. PDCPD based materials has unique flexibility, excellent material strength and low weight in comparison to other large-tonnage products such as steel or polyvinylchloride etc. But main superiorities of PDCPD are high weather resistance, resistance to UV-light and mentioned earlier mechanical properties. Also, PDCPD has very high resistance to acids and alkalis and has wide working temperature range from –40 to 110 °C. And matherials created using polydicyclopentadiene has excellent electrical insulation properties.

Polydicyclopentadiene has found its application in agriculture because it is not susceptible to rust and corrosion even when in contact with pesticides and fertilizers. Also because of it high chemical resistance he can be used in the production of chlorine bleaches and caustics for example caps of battery sections are made of PDCPD and create inert protective barrier for electrically conductive products. Elements made of polydicyclopentadiene are easy to point and have a high-quality surface because of that PDCPD is used in the manufacture of some automotive parts.

Polymers with fluorinated compounds, due to their unique dielectric and antifriction properties and thermal resistance, are widely used in various industries such as electrical engineering, automotive, chemical industry [4] and construction. Fluorinated polymers can be used for covering solar panels, insulation of electrical appliances or new high-speed communication networks such as 5G. This was made possible due to the high mechanical and chemical resistance of fluorinated polymers, their low dielectric constant and dielectric loss.

Dicyclopentadiene Uni wise (China) was used in the work, the declared purity is 95 %. Old DCPD (DCPD considered old when 6 months gone after its synthesis or purification) purified from exo-DCPD and tarring products with high temperature in the inert atmosphere and addition of metallic sodium.

The purpose of the article was to investigate best conditions for the reaction of the interaction of DCPD with perfluoropelargonic acid, the effects of the changing of the ratio of reagents DCPD : PFPA, reaction temperature and its changing during the reaction, tarring of products with increasing temperature and reaction time.

The synthesis was carried out in a three-necked flask, in a water bath equipped with a magnetic stirrer and a thermometer when PFPA was sprinkled with liquid DCPD. The reaction is carried out with active stirring for four hours and normal atmospheric pressure. The ratio of DCPD : PFPA was 1 : 1 accordingly. When process is done, reaction mass stays for 1 day and then washed and neutralized with methanol [5]. Non reacted PFPA neutralized with solution of 5 % sodium bicarbonate and water to pH of the products in range from 5 to 7.

When product was washed without methanol, a settling mixture of solution and water with a small separation into different phases is obtained for further purification of the resulting product.

The product is a dark brown solid, soluble in dichloromethane.

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THE IMPACT OF THE CO_2 CAPTURE PROCESS CONDITIONS ON THE RESOURCE EFFICIENCY OF TECHNOLOGY

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In conformity to the climatic doctrine of the Russian Federation [1], it is planned to reach the balance between anthropogenic emissions of greenhouse gases and their absorption no later than 2060.

Up to date, at the domestic market there is no ready to acquire and industrial use CO_2 extraction technology from flue gases. In the design of a pilot plant, the issue of choosing the most effective CO_2 capture technology and the selection of optimal reaction conditions is of importance.

Previously, it was found that some features typical for the most common emissions' sources of oil and gas companies make chemical absorption the only accessible capture technology. At the same time, the displacement of the equilibrium of the absorption reaction occurs with a decrease in temperature and an increase in pressure. Flue gases' high temperature (T = 550 °C) and low pressure (P = 2.5 kPag) impose significant restrictions on the CO_2 capture conditions and significantly complicate the process of CO_2 capture compared to the purification of natural-gas stripping.

The flue gases' pressure at the entrance to capture plant was determined on the basis that for gas stream it is necessary to overcome of hydraulic resistances in the scrubber and the absorber. Pressure was accepted equal to 130 kPa (Abs.). A further increase in the pressure of flue gases causes a significant increase in the energy consumption and a decrease in the resource efficiency of technology.

The optimal temperature determination was carried out at a gas stream's pressure at the entrance to the absorber equal to 120 kPa (Abs.), and the condition for 90 % of CO_2 extraction. The considered

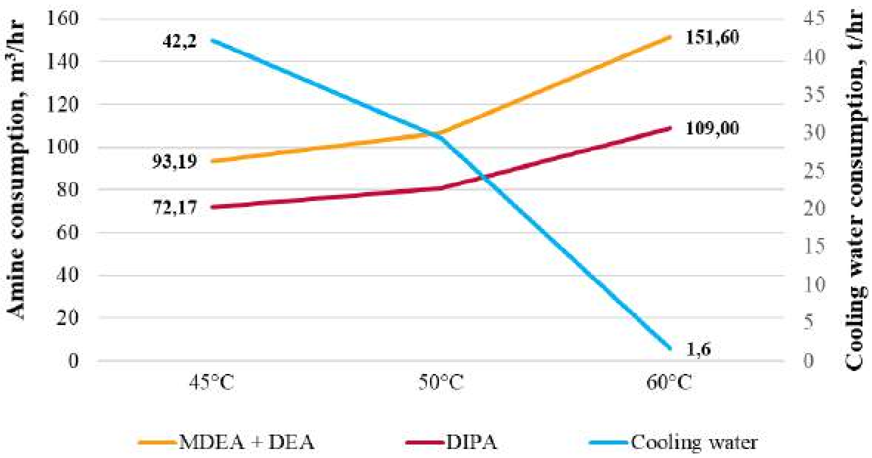

Fig. 1. *The impact of capture temperature on the amine consumption and cooling water consumption*