ELECTROCHEMICAL CHLOROHYDRINATION OF ISOPRENE

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We have previously informed about the method of electrochemical chlorohydration of divinyl in the conditions of electrolysis of hydrochloric acid [1].

The possibility of electrochemical chlorohydration of other conjugated dienes – isoprene has been studied in this work.

The process was carried out in glass electrolyzer by volume of 200 ml, equipped with anode of type OPTA and cathode from stainless steel. The reaction temperature was kept with thermostat through electrolyzer casing. At the end of the process the reaction product is extracted by diethyl ester, is distilled under vacuum and is identified with physical-chemical methods of analysis.

It has been established that the basic products of process of electrochemical treatment of isoprene in the conditions of electrolysis of hydrochloric acid are isomer mixture of dichloroisopentadiols:

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\begin{align*}
\text{CH}_3 & \quad \text{OH} \\
\text{CH}_2 = \text{C} & \quad \text{CH} = \text{CH}_2 + 2\text{Cl} \quad 2\text{OH} \quad -4e \\
\text{CH}_2 & \quad \text{C} \quad \text{OH} \\
\text{Cl} & \quad \text{Cl}
\end{align*}
\]

The optimal conditions providing the high yield of dichloroisopentadiols: temperature 50-70°C, current density on the anode 5-20 A/dm², ratio C₅H₆ : Cl = 1:1:1 and concentration of hydrochloric acid 5 – 15% weight have been studied. With providing of optimal parameters the yield of dichloroisopentanediols is 80% on current and 85% on substance.

Di- and tetrachloroderivatives of isoprene are formed as intermediate products, at concentration of hydrochloric acid are higher than 30% the chlorination products predominate.

With taking of potentiostatic and potentiodynamic curves the mechanism of electrochemical chlorohydration of isoprene has been investigated.