KINETIC MODEL OF ALKYLATION REACTION OF 2-METHYLPHENOL WITH ETHERYLENE

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The alkylation reaction of 2-methyphenol with ethylene in the presence of aluminosilicate catalyst containing modified modernite has been investigated. It has been established that as a result of this reaction the mixture of 2-methyl-4-ethyl- and 2-methyl-6-ethylphenols is basically formed. Total selectivity of the reaction is 84,7-93,2%; mass ratio of isomers corresponds to 1:1. In this case the reaction mixture contains insignificant quantity of 2-methylphenetole and 2-methyl-4,6-dimethylphenol. 2-Methyl-3-ethylphenol under these conditions is not formed.

\[
\begin{align*}
&\text{CH}_3 \\
&\text{HO} \\
&\text{CH}_3 + \text{C}_2\text{H}_4
\end{align*}
\]

The kinetic investigations of alkylation reaction of 2-methylphenol with ethylene was carried out in differential reactor. The kinetic parameters of the reaction have been determined. Minimum of squares sum of difference of reaction rates determined and calculated experimentally has been obtained in using the equations mentioned below:

\[
\begin{align*}
 r^I &= k_1 P_1 P_2^2; \\
 r^II &= k_{II} P_1 P_2^2; \\
 r^III &= k_{III} P_1 P_2^2; \\
 r^IV &= k_{IV} P_3 P_2; \\
 r^V &= k_{V} P_4 P_2
\end{align*}
\]

\(P_1, P_2, P_3, P_4\) are partial pressures of 2-methylphenol, ethylene, 2-methyl-6-ethylphenol and 2-methyl-4-ethylphenol, respectively.

The kinetic model sufficiently completely describes the chemical conversion taking place on surface of solid catalysts and is useful in wide values of entrance parameters. The proposed kinetic model is the base for modelling and optimization of technological process and it is of practical interest.