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ON REACTION RATE CONSTANTS Cl + CH3I, C3F7I, CF3I

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Last time reactions of chlorine atoms with iodine containing hydrocarbons both natural and antropogenic origin are attracted significant attention [see V. Dookwah-Roberts et al., 2008; T. J. Gravestock et al., 2008]. It is explained mainly by the potential extinguishing properties of these substances. What about chlorine atoms they are considered now to be possible very effective "destroyers" of hydrocarbons in the troposphere [see A.R.Ravishankara, 2009].

In the present work the reaction rate constants of chlorine atoms with CH_3I (k_1), C_3F_7I, (k_2) and CF_3I (k_3) have been measured at the temperature 295 K under conditions of the flow reactor. The rate constants of the reactions investigated have been turned out to be equal:

$k_1 = (0.9 \pm 15)\ 10^{-11}$ molecula^{-1}cm^{3}s^{-1}; $k_2 = (5.2 \pm 0.3)\ 10^{-12}$ molecula^{-1}cm^{3}s^{-1};

$k_3 = (7.4 \pm 0.6)\ 10^{-13}$ molecula^{-1}cm^{3}s^{-1}.

At measurements the concentration both chlorine atoms and iodine atoms have been measured by method of resonance fluorescence. It has been proved that under conditions of our experiments the reaction of chlorine atoms with CH_3I proceeds on the wall surface of the reactor while reactions of chlorine atoms with CF_3I and C_3F_7I do in the gas phase. At analysis of experimental data a method has been applied which allows to reveal the influence of the wall of the reactor on the rate of the reaction under investigation. Physical base of the method developed is an applying various carrier gases in the experiments to provide different conditions for the reactive components to reach the wall of the reactor. So, changing by the known way time of diffusion of active components to the wall of the reactor it is possible to estimate the wall effects on the rate of the reaction.