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KINETIC REGULARITIES OF PHOTOCHEMICAL PROCESSES IN AIR-METHANE GAS PHASE SYSTEM

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Methane is the most important representative of organic substances in the atmosphere. Its concentration significantly exceeds the concentration of the remaining organic compounds. In the last decade, the amount of methane in the atmosphere has increased at a rate of 1% per year. The main sources of methane emissions are energy, automobile and aviation transport, ferrous and non-ferrous metallurgy, chemical, petrochemical and coal industries. Methane ranks second after carbon dioxide in the efficiency of absorbing thermal radiation of the earth. The contribution of methane to the creation of the greenhouse effect is approximately 30% of the value adopted for carbon dioxide. As the content of methane increases, chemical processes in the atmosphere change, which can lead to a deterioration of the ecological situation on earth. The question naturally arises of the management of the chemical and physical processes in which methane takes part. The experiment was carried out under the following conditions: the range of variation of the composition of the mixture [CH_4-air]=0-100%, the reaction time of the reaction is up to 6 hours and at the wavelength of vacuum ultraviolet radiation (VUV -radiation)- λ=123 nm. In the experiment, the initial partial pressure of methane was: P1=0.13 kPa and P2=22.5 kPa. In this case, the partial pressure of air containing 2% of water vapor varied from 0.13 kPa to 99.8 kPa. The working pressure range is chosen in connection with the fact that it is at 0.13 kPa to 99.8 kPa that methane absorption is almost completely observed. Thus, the VUV (Vacuum ultraviolet) photolysis of a complex mixture of N_2-CH_4-O_2-H_2O was studied in the component ratio range air / CH_4 =0 750. The flux of the VUV- radiation is I=4.4 • 1015 quant/s.

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