Experimental study of chemiluminescence in UV and VIS range at hydrogen-oxygen mixtures ignition

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Nonequilibrium radicals are important intermediates in hydrogen-oxygen kinetics. Controlling the level of electronic and vibrational nonequilibrium can become the key for the changing the limits of hydrogen ignition, which has great practical importance. The purpose of this paper is an experimental study of the emission spectrum in the UV and VIS region of electronically nonequilibrium radicals and molecules, analysis of their impact on the ignition of hydrogen and the search for inhibitors and promoters to control the process of ignition. The stoichiometric hydrogen-oxygen mixtures ignition with additions of halogenated inhibitors of combustion ($C_2F_4Br_2$,CCl_4 etc) was studied behind the reflected shock wave in temperature range of 950-1200 K and pressure range of 2.5-6.5 bar. The concentration of the combustible mixture was 10% ($2H_2+O_2$) diluted with argon. Nonequilibrium radiation was detected in the UV at 220-310 nm and in visible range at 400-500 nm presumably corresponding to electronic excited radicals and molecules OH*, HO_2* and H_2O_2*. The temperature dependences of the ignition delay, measured by the appearance of radiation, were in agreement with other experimental data and numerical simulations. The temperature dependences of maximum radiation intensity have shown that the investigated additives results in a significant increase of emission. The possible kinetic reasons are discussed.