

An Experimental Study on Ethanol-Air Mixtures for Laminar Burning Velocity¹

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Abstract

In recent years the interest in renewable energy resources is increasing. Ethanol is considered as one of the promising alternative fuels. It has many advantages that make it an excellent motor fuel, Ethanol combustion relatively yields much lower amounts of poisonous carbon monoxide (that is very important in crowded cities), and it is also CO₂-neutral in regards to the greenhouse effect. In comparison with gasoline, ethanol needs less amount of air for combustion, so the stoichiometric ratio for gasoline is 15:1, but for ethanol is 9:1.

The burning velocity and flame structure of ethanol –air mixtures over a wide range of pressure and temperature have been studied using both a constant volume spherical and a cylindrical chamber with end windows. A thermodynamic model was used to calculate the burning velocity from the measured dynamic pressure rise in the spherical chamber. Photographic observations were made through the end windows in the cylindrical chamber. Smooth and cracked flames were all observed by using a high-speed camera.

¹ For the paper in Arabic see pages (181-206).

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