

# **Studies of influence of addition of hydrogen and water vapor on combustion performance and nitrogen oxide emissions in constant volume chamber**

by

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## ***Abstract***

Theoretical and experimental studies were carried out on the performance of combustion and emission of nitrogen oxides from combustion of hydrocarbon fuels with addition of water vapours as well as with additions of hydrogen. Experiments were conducted in the constant volume chamber. The main chamber was equipped with optical quality windows for Schlieren visualisation and with the small prechamber for generation of different level of turbulence. Additionally, to minimize the process of condensation of water vapours on the chambers walls and on the optical quality windows, chamber was heated to temperature in the range of 60-80 C<sup>0</sup>. Combustion performances were evaluated on the bases of maximum combustion pressure and the rate of pressure rise. Also high-speed Schlieren pictures of combustion in the chamber were taken. Concentration of nitrogen oxides was measured and calculated. Also comparison was made of measured and computed results.

It was generally found that both addition of hydrogen as well as water vapours decrease the value of emitted nitrogen oxides. Addition of water vapours is however more effective than hydrogen addition, since its lower combustion temperature. However addition of hydrogen could lower lean combustion limit of hydrocarbon mixture, thus by lowering combustion temperature decrease emission of nitrogen oxides.

***Key words:*** constant volume combustion, emission of pollutants