

Effects Of Obstacles On Premixed Hydrogen-Air Mixtures Explosion In Closed Pipe

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ABSTRACT

Results of experiments on explosion premixed hydrogen-air are presented. The data covers a wide range of hydrogen concentration between 13 to 54 % v/v ($\Phi = 0.4$ to 1.8). The experimental work was performed in a closed pipe containing 90 degree bends with a volume of 0.42 m³ operating at ambient conditions. This study was carried out to determine the severity of hydrogen explosion in a closed pipe with length over diameter (L/D) ratio of 51. The results indicate that the worst case accident for hydrogen-air mixture occur at concentration slightly above stoichiometric ($\Phi = 1.2$) or 36% v/v. It is also found that pressure downstream the bending region experienced an increase of about 2 times, compared to pressure at the bend. It can be said that a strong backflow or retonation reflecting from the end pipe wall influent the maximum overpressure downstream of the bend and this phenomenon was highlighted.

KEYWORDS: Bending, closed pipe, hydrogen concentration, pressure, retonation