

Hord, J.

Is Hydrogen Safe?

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ABSTRACT

The safety aspects of hydrogen are systematically examined and compared with those of methane and gasoline. Physical and chemical property data for all three fuels are compiled and used to provide a basis for comparing the various safety features of the three fuels. Each fuel is examined to evaluate its fire hazard, fire damage, explosive hazard and explosive damage characteristics. The fire characteristics of hydrogen, methane and gasoline, while different, do not largely favor the preferred use of any one of the three fuels; however, the threat of fuel-air explosions in confined spaces is greatest for hydrogen. Gasoline is believed to be the easiest and perhaps safest fuel to store because of its lower volatility and narrower flammable and detonable limits. It is concluded that all three fuels can be safely stored and used; however, the level of safety risk for each fuel will vary from one application to another. Generalized safety comparisons are made herein but detailed safety analyses will be required to establish the relative safety of different fuels for each specific fuel application and stipulated accident. The technical data supplied in this paper will provide much of the framework for such analyses. Hydrogen safety guidelines, regulatory codes applicable to the distribution of hydrogen, and safety criteria for liquid hydrogen storage are compiled and presented.

Key words: Explosion, fire, fuel, gasoline, hydrogen, methane, safety.