

HYDROGEN FUEL PROPERTIES COMPARISON

Understanding how the properties of hydrogen compare to other commonly used fuels is beneficial for making judgements on the validity of hydrogen as a fuel and safe handling of it.

Questions

1. In the table below compare and rate hydrogen, methane and petrol for each of the properties listed.

Property	Hydrogen H ₂ (g)	Methane CH ₄ (g)	Petrol (l)
Energy density (MJ/kg) is the amount of energy stored in a substance per unit mass.	120 - 142	50 - 55.5	44.5 - 48
Comparison:			
Flammability limits (vol% in air) indicate the range of the volumetric concentration of a gas or liquid vapour, in air that can lead to a self-sustaining fire if ignited. (Hint: Concentrations of fuel in air outside the range are considered non-flammable. The upper limit gives some indication of how hazardous a flammable gas is. The wider the flammable range the greater chance of a flammable mixture forming.)	4.0 - 75	5.3 - 15	1.0 - 7.6
Comparison:			
Minimum ignition energy (mJ) is the minimum spark energy needed to ignite an ideal concentration of fuel in air.	0.02	0.29	0.24
Comparison:			

Property	Hydrogen H ₂ (g)	Methane CH ₄ (g)	Petrol (l)
<p>Quenching distance (mm) in air, is the distance between two flat plates at which ignition of a flammable mixture is suppressed.</p> <p>(Hint: Faster burning gases have smaller quenching gaps.)</p>	0.64	2.0	2.0
Comparison:			
<p>Vapour specific gravity at 25°C, 1atm (air=1) is defined as the ratio of the density of a given substance, to the density of air.</p> <p>(Hint: Substances with a vapour specific gravity greater than 1 are heavier than air, and less than 1 are lighter than air)</p>	0.070	0.54	3.7
Comparison:			

2. Using the information provided and your comparisons, how does hydrogen compare to methane and petrol as a safe and effective energy source?

3. Which properties of hydrogen would be key considerations in the design of a safe hydrogen facility or workspace? Why?

4. What other factors should also be considered when making judgements about how hydrogen compares as an energy source?

Data from <https://h2tools.org/bestpractices/impact-hydrogen-properties-facility-design>



Queensland Resources Council - Mining and Energy Education