

Hydrogen

THE KEY TO CLEAN ENERGY



A HYDROGEN PARTICLE IS...



The smallest and lightest duo in the entire universe – two atoms bonded by an unbreakable connection, like cosmic partners. Though invisible, it holds immense power – capable of propelling rockets, powering cars, and forming water, while also being a building block of stars. You could say it's the tiniest giant shaping the universe!

PROPERTIES

- The lightest element – 14 times lighter than air.
- High calorific value – 120–142 MJ/kg, over 3 times more than gasoline.
- Clean combustion – no CO₂ emissions, the byproduct is water (H₂O).
- Renewable production – electrolysis using solar or wind energy (green hydrogen).
- Fuel cell applications – high efficiency and zero emissions.
- Challenging storage – requires high pressure (350–700 bar) or low temperatures (–253°C).
- Flammable and explosive – wide flammability range (4–75% in air).
- Versatile – transport, energy, industry, energy storage.

OCCURRENCE

- The most abundant element in the universe – makes up ~75% of the universe's mass.
- On Earth, found in compounds – rarely exists as a free gas.
- Water (H₂O) – the main source of hydrogen on Earth.
- Organic compounds – a component of hydrocarbons (crude oil, natural gas, biogas).
- Living organisms – present in proteins, fats, and carbohydrates.
- Atmosphere – trace amounts of hydrogen (~0.00005% of air volume).
- Sun and stars – a primary element, converted into helium through nuclear fusion.
- Volcanic gases and geothermal sources – natural hydrogen sources on Earth.