Storage of hydrogen gas

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The Recommended Best Practices for the Characterization of Storage Properties of ...

The Fuel Cell Technologies Office"s (FCTO"s) chemical hydrogen storage ...

Protocols for synthesizing storage materials in bulk and nanoscale formats; Ultra-high ...

Hydrogen can be produced through low-carbon pathways using diverse, ...

Hydrogen can be produced using a number of different processes. Thermochemical ...

Fact sheet produced by the Fuel Cell Technologies Office describing hydrogen ...

Physical Hydrogen Storage. Physical storage is the most mature hydrogen ...

??,,?,?:20.268 K??

Several methods exist for storing hydrogen. These include mechanical approaches such as using high pressures and low temperatures, or employing chemical compounds that release H2 upon demand. While large amounts of hydrogen are produced by various industries, it is mostly consumed at the site of production, notably for the synthesis of ammonia. For many years hydrogen has been stored as compressed gas or cryogenic liquid, and transported as such in cylinders, tubes, and cryogenic tanks for use in industry or as propellant in space programs. The overarching challenge is the very low boiling point of H2: it boils around 20.268 K (-252.882 ?C or -423.188 ?F). Achieving such low temperatures requires expending significant energy.

Although molecular hydrogen has very high energy density on a mass basis, partly because of its low molecular weight, as a gas at ambient conditions it has very low energy density by volume. If it is to be used as fuel stored on board a vehicle, pure hydrogen gas must be stored in an energy-dense form to provide sufficient driving range. Because hydrogen is the smallest molecule, it easily escapes from containers. Considering leakages, transport and production costs, hydrogen could have a Global Warming Potential over 100 years (GWP100) of 11.6.[1]

Compressed hydrogen is a storage form whereby hydrogen gas is kept under pressures to increase the storage density. Compressed hydrogen in hydrogen tanks at 350 bar (5,000 psi) and 700 bar (10,000 psi) are used for hydrogen tank systems in vehicles, based on type IV carbon-composite technology.[clarification needed][2] Car manufacturers including Honda[3] and Nissan[4] have been developing this solution.

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Liquid hydrogen tanks for cars, producing for example the BMW Hydrogen 7. Japan has a liquid hydrogen (LH2) storage site in Kobe port.[5] Hydrogen is liquefied by reducing its temperature to -253 ?C, similar to liquefied natural gas (LNG) which is stored at -162 ?C. A potential efficiency loss of only 12.79% can be achieved, or 4.26 kW?h/kg out of 33.3 kW?h/kg.[6]

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