

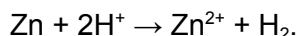
Hydrogen Chemistry Questions with Solutions

Q1. What are the isotopes of hydrogen?

Answer: The isotopes of hydrogen are protium (^1H), deuterium (^2D) and tritium (^3T).

Q2. Explain one method for the preparation of hydrogen in the laboratory.

Answer: Hydrogen can be prepared in the laboratory by the reaction of zinc granules with dilute hydrochloric acid.

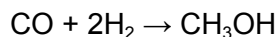


Q3. What is water gas?

Answer: The mixture of hydrogen and carbon monoxide is called water gas.

Q4. What is the use of water gas?

Answer: Water gas is used for the production of methanol and other hydrocarbons. Water gas is also called synthesis gas.



Q5. Explain one method for the commercial production of hydrogen

Answer: Hydrogen is produced commercially by the electrolysis of water in acidic medium using Pt electrodes.

Q6. What is the electron configuration of hydrogen?

Answer: The electron configuration of hydrogen is $1s^1$.

Q7. Match the following items of column 1 with column 2 and choose the correct answer:

Column 1	Column 2
1) $\text{H}_2 + \text{Cl}_2$	a) Water
2) $2\text{H}_2 + \text{O}_2$	b) Ammonia

3) $3\text{H}_2 + \text{N}_2$	c) Lithium hydride
4) $\text{H}_2 + 2\text{Li}$	d) Hydrogen Chloride

Answer:

Column 1	Column 2
1) $\text{H}_2 + \text{Cl}_2$	d) Hydrogen Chloride
2) $2\text{H}_2 + \text{O}_2$	a) Water
3) $3\text{H}_2 + \text{N}_2$	b) Ammonia
4) $\text{H}_2 + 2\text{Li}$	c) Lithium hydride

Q8. State two uses of hydrogen?

Answer: Hydrogen is used in fuel cells to generate electricity.
It is also used in the production of vanaspathi fat by hydrogenation of vegetable oils.

Q9. How are hydrides classified?

Answer: Hydrides are classified into 3 types- ionic hydrides, covalent hydrides and metallic hydrides.

Q10. What is the atomic mass of hydrogen?

Answer: The atomic mass of hydrogen is 1.00784 amu.

Q11. Which spectroscopy method is used primarily for structural analysis?

Answer: ^1H NMR is used primarily for structural analysis.

Q12. What are the drawbacks of hydrogen as a fuel?

Answer: Hydrogen is difficult to store and is also a highly flammable gas causing fire and explosion which makes it an unsafe resource.

Q13. What is the Lyman series?

Answer: The Lyman series of the hydrogen spectral series refers to the transition of electron from higher outer orbital to $n = 1$ level.

Q14. What are the series of lines in the hydrogen spectral series?

Answer: Lyman series, Balmer series, Paschen series, Brackett and Pfund are the series of lines in the hydrogen spectrum.

Q15. What is the Balmer series?

Answer: The Balmer series of the hydrogen spectral series refers to the transition of the electron from higher outer orbital to $n = 2$ level.

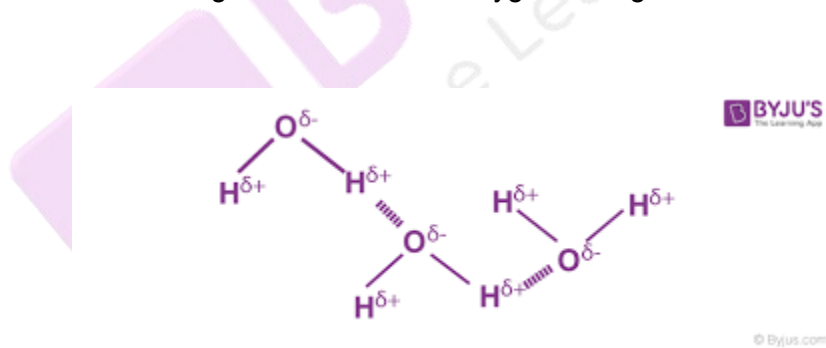
Practice Questions on Hydrogen

Q1. Who discovered the hydrogen element?

Answer: Henry Cavendish discovered the hydrogen element.

Q2. Explain Hydrogen bonding?

Answer: Hydrogen bonding is a strong intermolecular force that is seen in molecules containing hydrogen bonded to an electronegative element like oxygen, nitrogen or fluorine. For example, water (H_2O).



Q3. How many hydrogen bonds can water make?

Answer: Water can make 4 hydrogen bonds.

Q4. What is the value of the Bohr radius of a hydrogen atom?

Answer: The Bohr radius of a hydrogen atom is 0.0529×10^{-9} m.

Q5. What is the energy (in eV) of the ground state of a hydrogen atom?

Answer: The ground state energy of a hydrogen atom is -13.6 eV .

