



INDIAN SCHOOL MUSCAT

CLASS XI

CHEMISTRY WORKSHEET

HYDROGEN



Multiple Choice Questions:

- The number of neutrons in tritium, isotope hydrogen is
a) 1 b) 0 c) 2 d) 3
- When a sample of hard water is passed through a layer of sodium zeolite, the ions that will not be present in the resulting sample of water will be
a) Ca^{2+} b) Mg^{2+} c) Ca^{2+} and Mg^{2+} d) all ions will be removed
- Which one of the following hydrides are non-stoichiometric in nature?
a) Ionic hydrides b) Covalent hydrides c) Molecular hydrides d) Metallic hydrides
- Sodium polymetaphosphate is commercially termed
a) Zeolite b) Permutit c) Calgon d) lime
- Syn gas is a mixture of
a) $\text{CO} + \text{H}_2$ b) $\text{CO}_2 + \text{H}_2$ c) $\text{CH}_4 + \text{O}_2$ d) $\text{CH}_4 + \text{H}_2\text{O}$

Assertion[A] & Reasoning[R]

- (A) Both assertion and reason are correct statements, and the reason is the correct explanation of the assertion
(B) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion
(C) Assertion is correct, but reason is wrong statement
(D) Assertion is wrong, but reason is correct statement
(E) Both assertion and reason are wrong statements

- [A]: The color of old lead paintings can be restored by washing with dilute solution of H_2O_2
[R]: Black PbS is oxidized by H_2O_2 to white PbSO_4
- [A]: Dihydrogen is highly reactive at room temperature.
[R]: H-H bond enthalpy is the highest for any single bond.
- [A]: Hydrogen fuel pollutes the environment.
[R]: On combustion hydrogen releases toxic byproducts.
- [A]: Presence of soluble bicarbonates of calcium and magnesium results in temporary hardness.
[R]: Temporary hardness can be removed by boiling.

- 5 [A]: Hydrogen peroxide decomposes to water and oxygen on exposure to light.
[R]: Hydrogen peroxide is stored in colored bottles .

Answer the following questions:

1. Compare the structures of H_2O and H_2O_2 .
2. Complete the following equations
 - a) $\text{Mg}_3\text{N}_2 + \text{H}_2\text{O}(\text{l}) \rightarrow$
 - b) $\text{PbS}(\text{s}) + \text{H}_2\text{O}_2(\text{l}) \rightarrow$
 - c) $\text{MnO}_4^- (\text{aq}) + \text{H}_2\text{O}_2(\text{l}) (\text{acid}) \rightarrow$
 - d) $\text{CuO}(\text{s}) + \text{H}_2(\text{g}) \rightarrow$
 - e) $\text{CO}(\text{g}) + \text{H}_2(\text{g}) \rightarrow$
3. Describe the industrial applications of hydrogen dependent on:
 - a) The heat liberated when its atoms combine on the surface of the metal.
 - b) Effect on unsaturated organic systems in presence of a catalyst.
4. Differentiate between
 - a) Hydrolysis and hydration using suitable examples.
 - b) hard water and soft water
 - c) permanent hardness and temporary hardness
5. Explain giving reasons:
 - a) The dihedral angle in H_2O_2 decreases in the solid state.
 - b) Ionic hydrides are frequently used to remove traces of water from organic compounds.
 - c) Heavy water is used in nuclear reactors
 - d) Liquid hydrogen is used as a rocket fuel.
 - e) Ice floats on water.
 - f) Water has a higher boiling point than expected.
 - g) Hard water does not lather easily with soap.
 - h) Zeolite purified water is not de-ionised.
 - i) H_2O_2 is stored in wax-lined brown coloured bottles.
 - j) Urea is added to H_2O_2 during storage.
 - k) H_2O_2 is used to restore oil paintings.
 - l) Water is densest at 4°C .
 - m) Hydrogen is inert at room temperature
6. A binary compound of hydrogen is non-conducting in the solid state. On electrolysis of the molten compound, hydrogen was liberated at the anode. What class of compound is this? Give an example. Give equation for its reaction with water.
7. Name a hydride that can act as a) a Lewis acid b) Lewis base.
8. What is understood by hydrogen economy?
9. Write a balanced chemical equation for the formation of ammonia. Also mention the reaction conditions.
10. Discuss the different types of hydrides with examples.
11. Compare the principle and method of softening of hard water by
 - a) ion exchange method
 - b) synthetic resin method
12. Explain the following with equations

- a) Coal gasification
 - b) Water gas shift reaction
13. Describe the permutit process for softening of hard water
 14. What do you understand by auto protolysis of water?
 15. How will you show that H_2O_2 is a powerful oxidizing agent?