PRE-MEDICAL

INORGANIC CHEMISTRY

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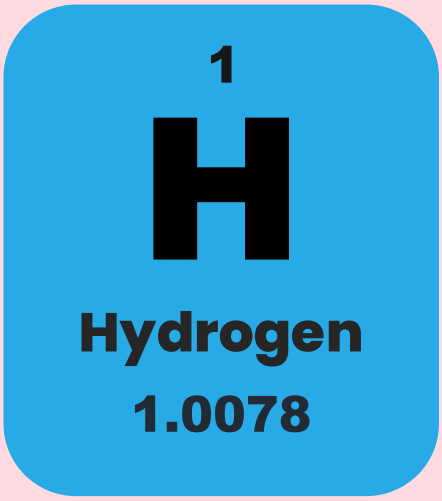


EXERCISE

Hydrogen & It's Compounds

ENGLISH MEDIUM

EXERCISE-I (Conceptual Questions) — Build Up Your Understanding

BASED ON HYDROGEN

1. Out of the following metals which will give H_2 on reaction with NaOH :
I : Zn, II : Mg,
III : Al, IV : Be
(1) I, II, III, IV (2) I, III, IV
(3) II, IV (4) I, III

HC0001

2. Hydrogen has the tendency to loose one e^- and form H^+, In this respect it resembles with :
(1) Alkali metal (2) Carbon
(3) Alkaline earth metal (4) Halogens

HC0003

3. H_2 gas can not be prepared by :-
(1) Be + NaOH (2) Na + NaOH
(3) Mg + NaOH (4) By (2 & 3) method

HC0004

4. Hydride gap in periodic table is from :-
(1) Group 7 to group 9
(2) Group 5 to group 7
(3) Group 4 to group 6
(4) Group 7 to group 10

HC0006

5. Which of the following reaction is called water gas shift reaction ?
(1) $C(s) + H_2O(g) \longrightarrow CO(g) + H_2(g)$
(2) $3Fe(s) + 4H_2O(steam) \longrightarrow Fe_3O_4 + 4H_2(g)$
(3) $CH_4(g) + H_2O(g) \xrightarrow[1270\,K]{Ni} CO(g) + 3H_2(g)$
(4) $CO(g) + H_2O(g) \xrightarrow[FeCrO_4]{673K} CO_2(g) + 3H_2(g)$

HC0007

6. Which of the following property of hydrogen is different from alkali metals.
(1) Can form halide
(2) Can form sulphide
(3) can form oxide
(4) Low IP

HC0050

7. Dihydrogen is of highest purity is obtained by
(1) electroysis of acidified water using platinum electrodes
(2) reaction of steam on coke.
(3) reaction of Sn with aqueous alkali
(4) electrolysis of warm aqueous solution of barium hydroxide between nickel electrodes

HC0051

BASED ON WATER

8. Which is true statement about D_2O and H_2O :-
(1) D_2O has lower dielectric constant than H_2O
(2) NaCl is more soluble in D_2O than in H_2O
(3) both are correct
(4) none is correct

HC0008

9. The reactions of heavy water are slow
The reason is :-
(1) Heavy water is associated
(2) Heavy water is dissociated
(3) High bond energy of D–O bond
(4) Heavy water is of lower mass

HC0009

10. Hard water when passed through ion exchange resin containing RCOOH group, becomes free from :-
(1) Cl^- (2) SO_4^{-2}
(3) H_3O^+ (4) Ca^{+2}

HC0010

11. Permutit is a technical name given to :-
(1) Aluminates of Ca and Na
(2) Hydrated silicates of Al and Na
(3) Silicates of Ca and Na
(4) Silicates of Ca and Mg

HC0011

12. The formula of sodium zeolite which is used in permutit process for softening water is :-
(1) $Na_2O.Al_2O_3.Si_2O_4.xH_2O$
(2) $Na_2.Al_2.Si_2O_4.xH_2O$
(3) $Na_2O.AlO_3.SiO_4.xH_2O$
(4) $K_2Al_2SiO_8.xH_2O$.

HC0012

13. The compound sodium hexameta phosphate $Na_2[Na_4(PO_3)_6]$ is called calgon because :-
(1) It was developed by the scientist
(2) It was developed first in California
(3) It refers to calcium gone
(4) It is based on the name of the company which developed it.

HC0013

14. Permanent hardness in water due to presence of :-
(1) Ca^{+}, Mg^{+}
(2) $CaCl_2$, $MgCl_2$
(3) $CaCO_3$, $MgCO_3$
(4) All

HC0014

15. In which of the following method of the removal of hardness, Ca^{+2} and Mg^{2+} are not separated from sample of hard water ?
(1) By boiling of temporary hard water
(2) Addition of sodium carbonate
(3) Using sodium hexametaphosphate
(4) Synethetic resins and zeolite method

HC0016

16. Incorrect option is
(1) $H_2O < D_2O$: density
(2) $H_2O < D_2O$: melting point
(3) $H_2O < D_2O$: boiling point
(4) $H_2O > D_2O$: viscosity

HC0052

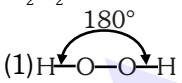
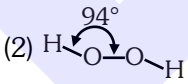
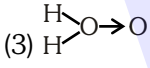
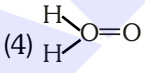
17. Zeolite is added in hard water to remove the impurity of $CaSO_4$ and $MgSO_4$. It exchanges
(1) Ca^{+2} and Mg^{+2} (2) SO_4^{2-}
(3) Both 1 and 2 (4) None of these

HC0053

BASED ON HYDROGEN PEROXIDE

18. H_2O_2 is used but not as :-
(1) oxidant, reductant (2) bleaching agent
(3) antiseptic (4) catalyst

HC0017

19. Which of the following is a true structure of H_2O_2:-
(1) 
(2) 
(3) 
(4) 

HC0018

20. The dipole moment of H_2O_2 is 2.1D. This indicates that the structure of H_2O_2 is :-
(1) Linear (2) Non-linear
(3) Symmetrical (4) None

HC0020

21. Bleaching action of H_2O_2 is due to its :-
(1) Oxidising nature
(2) Reducing nature
(3) Acidic nature
(4) Thermal instability

HC0021

22. Correct order of boiling point is :-
(1) $H_2 > H_2O_2 > D_2O > H_2O > D_2$
(2) $H_2O_2 > H_2 > D_2O > H_2O > D_2$
(3) $H_2O_2 > D_2O > H_2O > D_2 > H_2$
(4) $H_2O_2 > D_2O > H_2O > H_2 > D_2$

HC0022

23. $H_2O < H_2O_2$ order is incorrect for :-
(1) Boiling point (2) Acidic nature
(3) Dipole moment (4) Strength of H-bond

HC0023

24. H_2O_2 decomposes slowly on exposure to light in the presence of
(1) Metal surface (2) Traces of alkali
(3) Dust (4) All of these

HC0054

25. Which of the following option is incorrect ?
(1) H_2O_2 can act as a oxidising as well as reducing agent
(2) H_2O_2 is used in pollution control treatment of domestic and industrial effluents
(3) H_2O_2 is extensively used as a moderator in nuclear reactor
(4) H_2O_2 shows bleaching action

HC0055

EXERCISE-I (Conceptual Questions) — ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	2	1	4	1	4	4	4	1	3	4	2	1	3	2	3
Que.	16	17	18	19	20	21	22	23	24	25					
Ans.	4	1	4	2	2	1	3	4	4	3					

EXERCISE-II (Previous Year Questions) AIPMT/NEET

AIPMT 2010

1. Some statements about heavy water are given below:
(a) Heavy water is used as a moderator in nuclear reactor.
(b) Heavy water is more associated than ordinary water
(c) Heavy water is more effective solvent than ordinary water
Which of the above statements are correct ?
(1) (a), (b) and (c) (2) (b) and (c)
(3) (a) and (c) (4) (a) and (b)

HC0024

NEET-I 2016

2. Which of the following statements about hydrogen is **incorrect** ?
(1) hydrogen has three isotopes of which tritium is the most common.
(2) Hydrogen never acts as cation in ionic salts
(3) Hydronium ion, H_3O^+ exists freely in solution
(4) Dihydrogen does not act as a reducing agent

HC0025

NEET(UG) 2019

3. The method used to remove temporary hardness of water is :
(1) Calgon's method
(2) Clark's method
(3) Ion-exchange method
(4) Synthetic resins method

HC0056

NEET(UG) 2020

4. Match the following and identify the correct option.

(a) $CO(g) + H_2(g)$	(i) $Mg(HCO_3)_2 + Ca(HCO_3)_2$
(b) Temporary hardness of water	(ii) An electron deficient hydride
(c) B_2H_6	(iii) Synthesis gas
(d) H_2O_2	(iv) Non-planar structure

	(a)	(b)	(c)	(d)
(1)	(i)	(iii)	(ii)	(iv)
(2)	(iii)	(i)	(ii)	(iv)
(3)	(iii)	(ii)	(i)	(iv)
(4)	(iii)	(iv)	(ii)	(i)

HC0073

NEET(UG) 2021

5. Tritium, a radioactive isotope of hydrogen, emits which of the following particles ?
(1) Beta(β^-) (2) Alpha (α)
(3) Gamma (γ) (4) Neutron (n)

HC0074

NEET (UG) 2021 (Paper-2)

6. Which of the following statements regarding H_2O_2 is wrong?
(1) It is stable in acidic medium.
(2) It acts as oxidising as well as reducing agent.
(3) It has zero dipole moment.
(4) Pure H_2O_2 is slightly acidic.

HC0075

NEET(UG) 2022

7. Match **List-I** with **List-II**

List- I (Hydrides)	**List-II (Nature)**
(a) MgH_2	(i) Electron precise
(b) GeH_4	(ii) Electron deficient
(c) B_2H_6	(iii) Electron rich
(d) HF	(iv) Ionic

Choose the correct answer from the options given below :
(1) (a)-(iii), (b) - (i), (c) - (ii), (d)- (iv)
(2) (a)-(i), (b) - (ii), (c) - (iv), (d)- (iii)
(3) (a)-(ii), (b) - (iii), (c) - (iv), (d)- (i)
(4) (a) -(iv), (b) - (i), (c) - (ii), (d)- (iii)

HC0076

NEET(UG) 2022 (OVERSEAS)

8. Match **List-I** with **List-II** :

List-I (Commercial name)	**List-II (Chemical name)**
(a) Calgon	(i) Sodium aluminium silicate (hydrated)
(b) Permutit	(ii) Sodium carbonate
(c) Soap	(iii) Sodium hexameta-phosphate
(d) Washing soda	(iv) Sodium stearate

Choose the **correct answer** from the options given below :
(1) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
(2) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
(3) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
(4) (a)-(i), (b)-(iv), (c)-(ii), (d)-(iii)

HC0077

EXERCISE-II (Previous Year Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8
Ans.	4	1,4	2	2	1	3	4	1

EXERCISE-III (Analytical Questions) Master Your Understanding

1. Calgon is an industrial name given to :-
(1) normal sodium phosphate
(2) sodium meta-aluminate
(3) sodium hexametaphosphate
(4) hydrated sodium aluminium silicate
HC0028

2. Hydrogen may be prepared by heating a solution of caustic soda with :-
(1) Mg (2) Zn (3) Fe (4) Ag
HC0029

3. Hydrogen peroxide has a :-
(1) linear structure
(2) closed chain structure
(3) closed book type structure
(4) half open book type structure
HC0030

4. Hydrogen peroxide is a :-
(1) liquid (2) gas
(3) solid (4) semi-solid
HC0031

5. One of the following is an incorrect statement, point it out.
(1) Permanent hardness can be removed by boiling water
(2) Hardness of water effects soap consumption
(3) Temporary hardness is due to bicarbonates of Ca and Mg
(4) Permanent hardness is due to the soluble SO_4^{2-}, Cl^- of Ca and Mg
HC0032

6. Water is said to be permanently hard when it contains:-
(1) Chlorides and sulphates of Mg and Ca
(2) Bicarbonates of Na and K
(3) Carbonates of Na and K
(4) Phosphates of Na and K
HC0033

7. Which is the lightest gas :-
(1) Nitrogen (2) Helium
(3) Oxygen (4) Hydrogen
HC0034

8. False statement for H atom :-
(1) It resembles halogens in some properties
(2) It resembles alkali metals in some property
(3) It can not be placed in 1st group of periodic table
(4) It can be placed in 17th group of periodic table
HC0036

9. Boiling point of water is high due to presence of :-
(1) H–bonding
(2) Bent structure
(3) It high dielectric constant
(4) None
HC0037

10. Which one of the following removes temporary hardness of water :-
(1) Slaked lime (2) Plaster of paris
(3) $CaCO_3$ (4) Hydrolith
HC0039

11. Heavy water is used in nuclear reactors as :-
(1) Source of α - particles
(2) Slowing down the speed of high energy neutrons
(3) Transporting heat of the reactor
(4) Heating purposes
HC0040

12. Match list I with list II and select the correct answer using the codes given below the lists :-

List I	List II
1. Heavy water	**A.** Bicarbonates of Mg and Ca in water
2. Temporary hard water	**B.** No foreign ions in water
3. Soft water	**C.** D_2O
4. Permanent hard water	**D.** Sulphates and chlorides of Mg and Ca in water

(1) 1-C, 2-D, 3-B, 4-A
(2) 1-B, 2-A, 3-C, 4-D
(3) 1-B, 2-D, 3-C, 4-A
(4) 1-C, 2-A, 3-B, 4-D
HC0042

13. Shape of O_2F_2 is similar to that of :

(1) C_2F_2 (2) H_2O_2 (3) H_2F_2 (4) C_2H_2

HC0043

14. $PbS(s) + H_2O_2(aq.) \rightarrow x + H_2O$

x is -

(1) SO_2 (2) H_2S

(3) $PbSO_4$ (4) SO_3

HC0057

15. In which of the following chemical reaction H_2O_2 act as a reducing agent

(1) $Fe^{+2} + H_2O_2 \rightarrow Fe^{+3} + OH^-$

(2) $Mn^{+2} + H_2O_2 \rightarrow Mn^{+4} + OH^-$

(3) $MnO_4^- + H_2O_2 \rightarrow MnO_2 + O_2 + H_2O + OH^-$

(4) $PbS + H_2O_2 \rightarrow PbSO_4 + H_2O$

HC0058

16. Which of the following statement is incorrect ?

(1) Combustion of dihydrogen will be less than petrol

(2) Hydrogen economy is the transportation and storage of energy in the form of liquid or gas

(3) Hydrogen is used in fuel cells for generation in electric power

(4) A cylinder of compressed hydrogen weighs about 30 times less than a tank of petrol.

HC0059

17. Ni, Pd & Pt having tendency to adsorbed large amount of hydrogen is used in

(1) Calalytic reduction (2) Hydrogenation

(3) Both 1 & 2 (4) Oxidation

HC0060

18. d & f-block elements forms generally

(1) Saline hydride (2) Covalent hydride

(3) Interstitial hydride (4) None of these

HC0061

EXERCISE-III (Analytical Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**3**	**2**	**4**	**1**	**1**	**1**	**4**	**3**	**1**	**1**	**2**	**4**	**2**	**3**	**3**
Que.	16	17	18												
Ans.	**4**	**3**	**3**												