



## CHEMISTRY

# BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

## HYDROGEN

### Exercise 1

1. Hydrogen resembles halogens in many respects for which several factors are responsible. Of the following factors which one is most important in this respect ?

A. Its tendency to lose an electron to form a cation

- B. Its tendency to gain a single electron in its valence shell to attain stable electronic in its configuration
- C. Its low negative electron gain enthalpy value
- D. Its small size

**Answer: B**



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2. The most reactive isotope of H is

- A. protium
- B. deuterium
- C. tritium

D. All the above have same reactivity

**Answer: A**

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3. Tritium is obtained by

A. nuclear reactions

B. passing steam over heated  $C$

C. action of  $NaOH$  on  $Al$

D. action of  $H_2SO_4$  on  $Zn$

**Answer: A**

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4. Ortho and para-hydrogen differ in the

- A. number of protons
- B. molecular mass
- C. nature of spin of protons
- D. nature of spin of electrons

**Answer: C**

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5. When different metals like  $Zn$ ,  $Sn$  and  $Fe$  are added to diluted sulphuric acid, same gas, which burns explosively

in air, when evolved is

A.  $O_2$

B.  $N_2$

C.  $Cl_2$

D.  $H_2$

**Answer: D**



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6. Pure  $H_2$  is obtained by the action of

A. aluminium with potassium hydroxide

B. sodium hydride with water

C. electrolysis of warm solution of  $Ba(OH_2)$  using Ni electrodes

D. All of the above

**Answer: D**



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7. Hydrogen adsorbed on palladium is known as

A. atomic H

B. ortho H

C. occluded H

D. heavy H

**Answer: C**

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**8. The adsorption of hydrogen by metals is called :**

- A. adsorption
- B. occlusion
- C. hydrogenation
- D. dehydrogenation

**Answer: B**

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9. When silicon is boiled with caustic soda solution, the gas evolved is

A.  $O_2$

B.  $SiH_4$

C.  $H_2$

D. None of these

**Answer: C**



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10. Atomic hydrogen is obtained by

A. electrolysis of water



B. reaction of water heavy metals

C. thermal decomposition of water

D. passing silent electric discharge through hydrogen  
at low pressure

**Answer: D**



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**11. Ionic hydrides are formed by :**

A. transition metals

B. s-block elements

C. p-block elements

D. metalloids

**Answer: B**

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12. Consider the following statements about intermolecular and intramolecular hydrogen bonds.
- I. Both types of H-bonds are temperature dependent.
  - II. Intramolecular H-bonds disappear on increasing the concentration
  - III. Intramolecular H-bonds disappear on decreasing the concentration
  - IV. The boiling point of compounds having intramolecular H-bond are lower than that of those compounds which

have intermolecular H- bonds

Which of the statement given above are correct ?

A. I, II and IV

B. III and IV

C. I, III and IV

D. I and II

**Answer: A**



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**13.** The boiling points of water is high because

A. water molecule is linear

B. water molecule is not linear

C. water molecule possess covalent between H and O

D. water molecules associates due to H-bonding

**Answer: D**



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**14.** Ice floats on water because

A. its density is less than that of water

B. crystal structure of ice has empty space

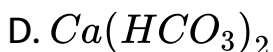
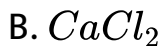
C. Both (a) and (b)

D. None of the above

**Answer: C**

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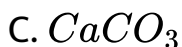
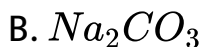
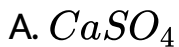
15. Temporary hardness of water is caused due to the presence of



**Answer: D**

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16. Both temporary and permanent hardness is removed on boiling with

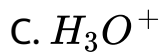


**Answer: B**



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17. Hard water becomes free from . . . . ions when passed through ion exchange resin containing RCOOH groups.

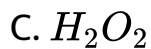
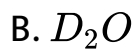


**Answer: D**



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**18.** The moderator used in nuclear reactor is



D.  $R - O - R$

**Answer: B**

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19. Which of the following statements are correct regarding  $D_2O$  and  $H_2O$ ?

I.  $D_2O$  reacts with  $Al_4C_3$  at a faster rate than does  $H_2O$ .

II. The freezing point of  $D_2O$  is higher than that of  $H_2O$ .

III. NaCl is more solution in  $D_2O$  than in  $H_2O$ .

IV. Ionic product of  $D_2O$  is smaller than that of  $H_2O$ .

Select the correct answer using the codes given below.

A. I and II



B. I and III

C. II and III

D. II and IV

**Answer: D**



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**20. Mass percentage of deuterium in heavy water is**

A. same as that of protium in water

B. 11.1

C. 20.0

D. cannot be predicted

**Answer: C**

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**21.** The critical temperature of water is higher than that of

$O_2$  because the  $H_2O$  molecule has

A. fewer electrons than oxygen

B. two covalent bonds

C. V-shape

D. dipole moment

**Answer: D**

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22. When two ice cubes are pressed over each other, they unite to form one cube. Which of the following forces is responsible to hold them together ?

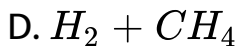
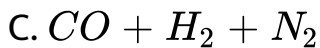
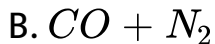
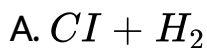
- A. Ionic interaction
- B. van der Waals' forces
- C. Covalent interaction
- D. Hydrogen and formation

**Answer: D**



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23. Semi water gas is



**Answer: C**



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**24.**  $H_2O_2$  is stored in

A. iron container after the addition of stabiliser

B. glass container after the addition of stabiliser

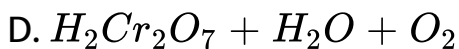
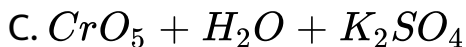
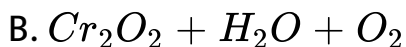
C. plastic container after the addition of stabiliser

D. Both (b) and (c)

**Answer: C**

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25. Acidified solution of  $K_2Cr_2O_7$  on treatment with  $H_2O_2$  yields :



**Answer: C**



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26. Blackened old painting can be restored into original form by the action of

A. chlorine

B.  $BaO_2$

C.  $H_2O_2$

D.  $MnO_2$

**Answer: C**



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27. Dielectric constant of  $H_2O_2$

- A. increases with dilution
- B. decreases with dilution
- C. is unaffected on dilution
- D. None of the above

**Answer: A**



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28. The basic principle of hydrogen economy is

- A. the transportation and storage of energy in the form of liquid or gaseous dihydrogen
- B. the transportation and storage of energy in the form of liquid or gaseous deuterium
- C. the transportation and storage of energy in the form of liquid or gaseous tritium
- D. None of the above

**Answer: A**

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**29.** In fuel cell, the percentage of bond energy is converted into electricity is



A. 71

B. 75

C. 68

D. 78

**Answer: B**



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**30.** The species that do not contain peroxide ions, is

A.  $PbO_2$

B.  $H_2O_2$

C.  $SrO_2$

D.  $BaO_2$

**Answer: A**

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**31.** The volume strength of 1 · 5 N  $H_2O_2$  solution is

A. 4.8

B. 8.4

C. 3.0

D. 8.0

**Answer: B**

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32. How does  $H_2O_2$  differ from  $O_2$  in its chemical action?

- A. In oxidising PbS to  $PbSO_4$
- B. In decolourising  $I_2$  from KI
- C. In decolourising acidified  $KMnO_4$
- D. In oxidising  $K_4[Fe(CN)_6]$  to  $K_3[Fe(CN)_6]$

**Answer: C**



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33. A given solution of  $H_2O_2$  is of 30 volume. Its concentration in terms of molarity is

A. 9.1 M

B. 2.68 M

C. 2.1 M

D. 26.8 M

**Answer: B**



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**34.** Match the following columns and choose the correct option given below.



A.    A    B    C    D  
      4    3    2    1

B.    A    B    C    D  
      1    2    3    4

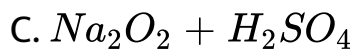
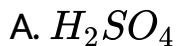
C.    A   B   C   D  
      1   3   2   4

D.    A   B   C   D  
      4   2   3   1

**Answer: A**

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**35.** The laboratory method for the preparation of  $H_2O_2$  is by



D. All of these

**Answer: C**

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## Exercise 2

1. Nascent hydrogen is prepared by

A.  $Na$  and  $C_2H_5OH$

B. Al and NaOH

C. Zn and dil.  $H_2SO_4$

D. All of these

**Answer: D**



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2. The metal, which gives hydrogen on treatment with acid as well as sodium hydroxide is

A. Fe

B. Zn

C. Cu

D. none of these

**Answer: B**



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3. Why does  $H^+$  ion always get associated with atoms or molecules ?

A. Ionisation enthalpy of hydrogen resembles that of alkali metals

B. Its reactivity is similar to halogens

C. It resembles both alkali metals and halogens

D. Loss of an electron from hydrogen atom results in a nucleus of very small size as compared to other atoms or ions. Due to small size, it cannot exist free

**Answer: D**



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4. The maximum possible number of hydrogen bonds in a water molecule can form in ice is

A. 1

B. 2

C. 3

D. 4

**Answer: D**



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5.  $NH_3$  and  $H_2O$  form  $NH_4OH$  by

A. electrovalent bond

B. covalent bond

C. coordination bond

D. none of these

**Answer: A**



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6.  $100\text{mL}$  of tap water containing  $\text{Ca}(\text{HCO}_3)_2$  was titrated with  $\frac{N}{50}\text{HCL}$  with methyl orange as indicator. If  $30\text{mL}$  of  $\text{HCL}$  was required, the temporary hardness of water as parts of  $\text{CaCO}_3$  per  $10^6$  parts of water was

A. 150 ppm

B. 600 ppm

C. 275 ppm

D. 300 ppm

**Answer: D**

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7. When zeolite, which is hydrated sodium aluminium silicate, is treated with hard water, the sodium ions are exchanged with

A.  $H^+$  ion

B.  $Ca^{2+}$  ion

C.  $SO_4^{2-}$  ion

D.  $OH^-$  ion

**Answer: B**

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8. The molarity of a 100 mL solution containing 5.1 g of hydrogen peroxide is

A. 0.15 M

B. 1.5 M

C. 3.0 M

D. 50.0 M

**Answer: B**

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9. 1000g aqueous solution of  $CaCO_3$  contains 10g of calcium carbonate, hardness of the solution is

A. 10 ppm

B. 100 ppm

C. 1000 ppm

D. 10000 ppm

**Answer: D**



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10. The oxidising property of  $H_2O_2$  is best explained by assuming that two oxygen atoms in its molecule are

bonded

- A. differently
- B. similarly
- C. covalently
- D. by hydrogen bonds

**Answer: A**

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11. Hydrogen peroxide is used as

- A. an oxidant only
- B. a reductant only

C. an acid only

D. All of the above

**Answer: D**



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**12.** Decomposition of  $H_2O_2$  is favoured by

A. traces of acids

B. alcohol

C. acetanilide

D. MnO

**Answer: D**



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13. Match the following columns and choose the correct option.



A.    A   B   C   D  
      1   3   2   4

B.    A   B   C   D  
      4   3   1   2

C.    A   B   C   D  
      4   1   3   2

D.    A   B   C   D  
      2   3   1   3

**Answer: B**



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14. Last molecule of  $H_2O$  is evolved from  $H_2O_2$  by

A. crystallisation

B. evaporation

C. distillation under reduced pressure

D. electrolysis

**Answer: A**



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15. The volume of 10 volume  $H_2O_2$  solution that decolourises 200mL of  $2NKMnO_4$  solution in acidic medium is

A. 112 mL

B. 336 mL

C. 220 mL

D. 224 mL

**Answer: D**



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**16.** Hydrolysis of one mole of peroxodisulphuric acid produces

A. two moles of sulphuric acid

B. two moles of peroxomonosulphuric acid

C. one mole of sulphuric acid and one mole of peroxomonosulphuric acid

D. one mole of sulphuric acid, one mole of peroxomonosulphuric acid and one mole of hydrogen peroxide

**Answer: C**



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**17. 100 volume hydrogen peroxide solution means**

A. 17.86 N

B. 30.36 %  $H_2O_2$

C. 8.93 M

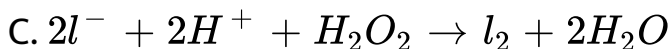
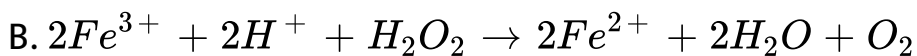
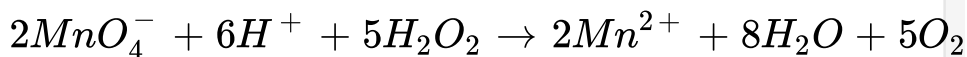
D. all are correct

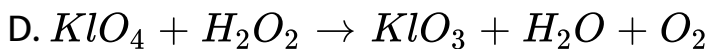
**Answer: D**

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**18.** Which of the following equations depict the oxidising nature of  $H_2O_2$  ?

A.





**Answer: C**

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**19.** What is the volume of  $O_2$  liberated at NTP by complete decomposition of 100 mL of 2M solution of  $H_2O_2$  ?

- A. 2.24 L
- B. 22.4 L
- C. 44.8 L
- D. 11.2 L

**Answer: A**

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20. Excess of KI and dill.  $H_2SO_4$  were mixed in 50 mL  $H_2O_2$ . Thus,  $I_2$  liberated requires 20 mL of 0.1 N  $Na_2S_2O_3$ .

What will be the strenght of  $H_2O_2$  in  $g L^{-1}$  ?

A. 0.034

B. 0.68

C. 6.8

D. 5.8

**Answer: B**

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