CHEMISTRY

JEE MAIN AND ADVANCED

HYDROGEN

Example

1. On the basis of electron affinity, comment on the resemblance of hydrogen with halogens.

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2. Which isotope of hydrogen is radioactive in nature?

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3. Which isotope of hydrogen contains equal number of proteons and neutrons?

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4. Comment on the reaction of dihydrogen with fluorine.

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5. Explain the use of hydrogen in the formation of vegetable fats.

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6. Which class of covalent hydrides are considered as lewis acids?

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7. Association of molecules in water is due to:

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8. Describe the nature of ionic hydrides.

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9. Why do alcohol (a covalent compound) dissolves in water (ionic)?

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10. Which properties of hydrogen as responsible for moderation of the climate and body temperature of living beings?

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11. Compare the density of ice and water.

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12. Does water gets oxidised in the process of photosynthesis?

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13. What type of water forms scum with soap?

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14. Write the reaction that takes place on adding lime to water containing magnesium bicarbonate.

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15. Explain with the help of reactions that how heavy water is used in the preparation of deuterium compounds?

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16. What is calgon?

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17. Calculate the strength of 30 volume solution of hydrogen peroxide.

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18. What is the percentage strength of a solution of 100 volume H_2O_2?

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19. Why H_2O_2 is kept away from dust?

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20. $PbS(s) + 4H_2O_2(aq) \rightarrow PbSO_4(s) + 4H_2O(l)$

In the above reaction, H_2O_2 acts as a/an____agent.

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Try Yourself

1. Explain how ydrogen differs from alkali metals on the basis of ionisation energies.

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2. On the basis of their electronic configuration, explain why alkali metals are highly reactive?

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3. Which isotope of hydrogen has no neutron?

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4. Which isotope of hydrogen is known as ordinary hydrogen?

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5. Define isotopes why do isotopes have same atomic number but differente mass numbers? Explain with the help an example.

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6. Comment on the reactions of dihydrogen with (a) chlorine, (b) sodium and (c) copper (II) oxide.

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7. In what ratio is nitrogen and hydrogen required to form ammonia?

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8. In the laboratory preparation of hydrogen, pure zinc is not used because

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9. What is 'syn' gas?

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10. On what basis are the molecular hydrides classified?

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11. a. Would you except the hydrides of N, O and F to have lower boiling points than the hydrides of their subsequent group members? Give reason.

b. Can phosphorous with outer electronic configuration $3s^2 3p^3$ form PH_5?

c. How many hydrogen-bonded water molecules(s) are associated with $CuSO_4.5H_2O$?

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13. What are non-stoichiometric compounds ?

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14. Which basis class of molecular hydrides act as lewis bases?

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15. How is lithium aluminium hydride prepared? What is its important use?

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16. How many hydrogen-bonded water molecule(s) are associated in $CuSO_4.5H_2O$?

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17. Which property of water is responsible for its very strong hydrating tendency?

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18. Water acts as a/an _____when it reacs with ammonia.

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19. Cation exchange resins are generated by treating with_____.

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20. Why temporary hardness of water is called so?

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21. Which anions produce permanent hardness in water?

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22. Which of the following pair of ions makes the water hard(temporary) ?

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23. Write few uses of heavy water.

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24. There is a smaple of 10 volume of hydrogen peroxide solution . Calculate its strength.

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25. H_2O_2 is always stored in black bottles because

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26. Is H_2O_2 planar in nature?

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27. Explain how hydrogen differs from alkali metals on the basis of ionisation energies.

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28. On the basis of electronic configureation, how hydrogen resembies alkali metals ?

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29. Which isotope of hydrogen has no neutron?

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30. Which isotope of hydrogen is known as ordinary hydrogen?

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31. Write the names of the three isotopes of hydrogen. What is the mass ratio of thse isotopes?

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40. What do you understand by the term “non-stoichiometric hydrides”? Do you expect this type of the hydrides to be formed by alkali metals? Justify your answer.

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41. Which basis class of molecular hydrides act as lewis bases?

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42. How is lithium hydride useful ?

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43. How many hydrogen-bonded water molecule(s) are associated in $CuSO_4.5H_2O$?

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44. Which property of water is responsible for its very strong hydrating tendency?

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45. Water acts as a/an _____when it reacs with ammonia.

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46. The number of water molecule(s) derectly bonded to the metal centre in $CuSO_{4.5}H_2O$ is

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47. Cation exchange resins are generated by treating with____.

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48. Why temporary hardness of water is called so?

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49. Which anions produce permanent hardness in water?

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50. Which of the following pair of ions makes the water hard(temporary) ?

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51. Write few uses of heavy water.

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52. Calculate the strength of 10 volume solution of hydrogen peroxide.

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53. How is H_2O_2 stored ?

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54. Is H_2O_2 planar in structure ?

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Assignment Section A

1. The ionisation energy of hydrogen is high as compared to alkali metals because of

A. One electron in outermost shell

B. Small size

C. One proton in its nucleus

D. No neutron

Answer: B

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2. Which of the following is the correct statement?

A. Hydrogen has the same I.E. as that of alkali metals

B. Hydrogen has strong tendency to gain one electron same as that of alkali metals

C. Hydrogen molecule is diatomic so are the halogens

D. Electron affinity of hydrogen is same as that of halogens

Answer: C

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3. The isotope of hydrogen which is radioactive is

A. Protium

B. Tritium

C. Deuterium

D. Neutron

Answer: B

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4. Hydrogen accepts an electron to form inert gas configuration. In this it resembles

A. halogens

B. Alkali metals

C. Alkaline earth metals

D. Chalcogens

Answer: A

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5. The volume of O_2 liberated from 0.96g of H_2O_2 is

A. 224.6 mL

B. 320.5mL

C. 390.0 mL

D. 112.5 mL

Answer: B

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6. The composition of tritium is

A. 1 electron, 1 proton, 1 neutron

B. 1 electron, 2 protons, 1 neutron

C. 1 electron, 1 proton, 2 neutrons.

D. 1 electron, 1 proton, 3 neutrons

Answer: C

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7. Hydrogen acts as a reducing agent and thus resembles

A. halogen

B. Noble gas

C. Radioactive elements

D. Alkali metals

Answer: D

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8. Which position for hydrogen explain all its properties ?

A. At the top of halogens

B. At the top of alkali metals

C. At the top of chacogens

D. Both 1 and 2

Answer: D

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9. Ionisation energy of hydrogen is

A. Equal to that of fluorine

B. Lower than that of fluorine

C. slightly higher than that of fluorine

D. Much higher than that of fluorine

Answer: B

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10. Which of the following statements concerning protium, deuterium and tritium is not true ?

A. They are isotopes of each other

B. They have similar electronic configurations

C. they exist in the nature in the ratio of 1:2:3 respectively

D. Their mass numbers are in the ratio 1:2:3 repsectively.

Answer: C

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11. Deuterium differs from hydrogen ?

A. Chemical properties

B. Physical properties

C. Both chemical and physical properties

D. Their radioactive properties.

Answer: B

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12. Number of nucleons in D_2 molecule is

A. 1

B. 2

C. 3

D. 4

Answer: D

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13. Water gas is

A. $CO + H_2$

B. $CO_2 + H_2$

C. $CO + H_2O$

D. $CO_2 + N_2$

Answer: A

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14. The catalyst used in the water-gas shift reaction is

A. Sodium arsenite

B. Nickel

C. Potassium permanganate

D. Iron chromate

Answer: D

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15. The reaction between which of the following reactants produces hydrogen?

A. $Zn + HCl$

B. $BaO_2 + HCl$

C. $K_2S_2O_8 + H_2O$

D. $Na_2O_2 + HCl$

Answer: A

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16. High purity dihydrogen is obtained by electrolysing

A. Warm aqueous barium hydroxide

B. Brine solution

C. Acidified sulphate solution

D. Water gas

Answer: A

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17. Hydrogen is not obtained when zinc reacts with

A. Cold water

B. Hot NaOH solution

C. Conc. Sulphuric acid

D. Dilute HCl

Answer: C

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18. The process by which ammonia is formed from nitrogen and hydrogen is

A. Contact process

B. Haber process

C. Ostwald process

D. Hydrogenation process

Answer: B

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19. Hydroformylation of olefins yields

A. Alkanes

B. Alkynes

C. Aldehydes

D. Carboxylic acids

Answer: C

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20. Which of the following is not the use of dihydrogen?

A. It is used as a bleaching agent

B. It is used in the preparation of ammonia

C. It is used in the preparation of methanol

D. It is used as a rocket fuel

Answer: A

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21. Alkali metal hydrides react with water to give

A. Acidic solution

B. Basic solution

C. Neutral solution

D. Hydride ion

Answer: B

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22. Ionic hydrides are usually

A. Good conductors of electricity in solid state

B. Stoichiometric compounds

C. Volatile

D. Non-crystalline

Answer: B

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23. Group 2 hydrides with significant covalent character is/are

A. BeH_2

B. MgH_2

C. CaH_2

D. Both 1 and 2

Answer: D

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24. In which of the compounds does hydrogen have an oxidation state of -1 ?

A. CH_4

B. NH_3

C. HCl

D. CaH_2

Answer: D

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25. The $H - O - H$ angle in water molecule is about

A. 90°

B. 180°

C. $109^\circ 28'$

D. 104.5°

Answer: D

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26. The low density of ice compared to water is due to

A. Intense covalent bonding

B. Dipole-induced dipole interaction

C. Intense hydrogen bonding

D. Dipole-dipole interactions

Answer: C

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27. Hardness of water cannot be removed by

A. Treating with washing soda

B. Boiling

C. Adding calgon

D. Addition of chlorine.

Answer: D

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28. Temparary hardness may be removed from water adding.

A. $CaCO_3$

B. $Ca(OH)_2$

C. $CaSO_4$

D. HCl

Answer: B

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29. H_2O_2 is stored in

A. Glass containers

B. Metallic vessels

C. Plastic vessels

D. Conttainers exposed to sunlight.

Answer: C

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30. Permanent hardness can be removed by adding

A. Slaked lime

B. Sodium bicarbonate

C. Washing soda

D. Calcium hydroxide

Answer: C

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31. Which of the following statements is not true?

A. the temporary hardness is due to presence of Ca and Mg bicarbonates

B. permanent hardness is removed by adding lime

C. permanent hardness is due to the presence soluble Ca and Mg sulphates and chlorides

D. Temporary hardness is removed by boiling

Answer: B

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32. Permutit is :

A. Hydrated sodium aluminium silicate

B. Sodium hexaphosphate

C. Sodium bicarbonate

D. Calcium hydroxide

Answer: A

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33. In cation exchange process for removing hardness of water, the resulting water turns

A. Acidic

B. Basic

C. Neutral

D. Both 1 and 2

Answer: A

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34. Heavy water is

A. De-mineralised water

B. De-ionized water

C. Ordinary water containing dissolved salts of heavy metals

D. It is the compounds of heavier isotope of hydrogen with oxygen (D_2O)

Answer: D

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35. The structure of H_2O_2 is

A. Open book like

B. Closed book like

C. Pyramidal

D. Linear

Answer: A

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36. The dihedral angle in gaseous H_2O_2 is

A. 111.5°

B. 90.2°

C. 94.8°

D. 101.9°

Answer: B

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Assignment Section B

1. Dipole moment of H_2O_2 is non-zero as

A. Two dipole moments are opposite but unequal

B. Two dipole moments are opposite and equal

C. Two dipole moments are equal but not at 180°

D. Two dipole moments are equal but non-planar.

Answer: D

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2. An orange coloured solution acidified with H_2SO_4 and treated with a substance $'X'$ gives a blue coloured solution of CrO_5. The substance $'X'$ is

A. H_2O

B. Dil. HCl

C. H_2O_2

D. Conc. HCl

Answer: C

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3. Number of $H-$ bonds formed by a water molecule is:

A. 2

B. 8

C. 1

D. 4

Answer: D

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4. When 1 mole of PbS reacts completely with H_2O_2

A. H_2 is liberated

B. O_2 is liberated

C. 4 moles of H_2O_2 consumed

D. Sulphur is converted to sulphite

Answer: C

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5. The term hydride gap refers to which region of periodic table?

A. Groups 6 to 9

B. groups 7 to 9

C. groups 7 to 10

D. groups 5 to 7

Answer: B

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6. Which one is true about nascent hydrogen?

A. More reactive than molcular hydrogen

B. can be produced in situ

C. Show similarity exactly with hydrogen in reduction reactions

D. both 1 and 2

Answer: D

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7. 2-Ethyl anthraquinol when oxidised in air produces

A. O_3

B. H_2O_2

C. H_2O

D. C_2H_5OH

Answer: B

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8. In alkaline medium, which elements can produce hydrogen?

A. Zn, Si

B. Cu, Ag

C. Cu, N_2

D. Al, C

Answer: A

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9. Select the incorrect statement

A. Ortho and para hydrogen are different due to difference in their nuclear spins

B. Ortho and para hydrogen are different due to difference in their electron spins

C. Para hydrogen has a lower internal energy than that of ortho hydrogen

D. Para hydrogen is more stable at lower temperature

Answer: A

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10. Hydride ion is a

A. Strong conjugate acid of H_2

B. Strong conjugate base of H_2

C. Strong conjugate acid of H^+

D. Strong conjugate base of H^-

Answer: B

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11. Ionic hydrides react with water to

A. Give acidic solutions

B. Give basic solutions

C. Produce hydride ions

D. Produce protons

Answer: B

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12. The boiling point of water is exceptionally high because

A. Covalent bond between H and O

B. Linear shape

C. Hydrogen bonding

D. Non-linear shape

Answer: C

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13. Metallic Hydrides

A. Are also called interstitial hydrides

B. Are non-stoichiometric, being deffcient in hydrogen

C. re poor conductors of electricity, exhibit less paramagnetism and have hydrogen as atom and not as a molecular.

D. Have all properties given above

Answer: D

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14. In the following reaction using isotopic $.^{18}O$ in $H_2O_2, 2MnO_4^- + 3H_2O_2^{18} \rightarrow 2MnO_2 + 3O_2 + 2H_2O + 2OH^-$ isotopic oxygen goes

A. Both with O_2

B. Both with MnO_2

C. Both with OH^-

D. One with O_2 and one with MnO_2

Answer: A

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15. H_2O_2 can be obtained when following reacts with H_2SO_4 excepts with

A. PbO_2

B. BaO_2

C. Na_2O_2

D. SrO_2

Answer: A

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16. Consider LiH, MgH_2 and CuH:

A. All are ionic hydrides

B. LiH, MgH_2 are ionic and CuH is covalent hydride

C. All are covalent hydrides

D. LiH is ionic, MgH_2 and CuH are intermediate hydrides.

Answer: D

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17. Consider the following reactions

I. $AlH_3 + H^- \rightarrow AlH_4^-$

II. $H_2O + H^- \rightarrow H_2 + OH^-$

Select the correct statement based on these reactions.

A. H^- is a lewis acid in I and lewis base in II

B. H^- is a lewis base in I and brosted base in II

C. H^- is a lewis acid in I and brosted acid in II

D. H^- is a lewis base in I and II

Answer: B

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18. Which among the following is interstitial hydride?

A. ScH_2

B. LaH_2

C. $TiH_{1.7}$

D. All of these

Answer: D

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19. Heavy water is

A. H_2O with dissolved $Mg(HCO_3)_2$

B. D_2O

C. D_2O with heavy metal impurities

D. H_2O with $CaCO_3$

Answer: B

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Assignment Section C

1. Which compound/s is/are saline hydride?

A. CaH_2

B. HCl

C. ScH_2

D. SrH_2

Answer: A::D

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2. Which compound/s is/are metallic hydrides?

A. KH

B. VH

C. PH_3

D. TiH_3

Answer: B::D

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3. Which compound/s is/are covalent hydrides?

A. CH_4

B. CsH

C. HCl

D. NaH

Answer: A::C

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4. Examples of polymeric hydrides are

A. BH_3

B. BeH_2

C. NaH

D. CaH_2

Answer: A::B

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5. Which group elementof d-block do not form hydride at all?

A. 7

B. 8

C. 9

D. 10

Answer: A::B::C

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6. Which reaction shows oxidising nature of H_2O_2?

A. $Ag_2O + H_2O_2 \rightarrow Ag + H_2O + O_2$

B. $MnO_2 + H_2O_2 + H_2SO_4 \rightarrow MnSO_4 + 2H_2O + O_2$

C. $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

D.

$$K_2Cr_2O_7 + H_2SO_4 + 4H_2O_2 \rightarrow K_2SO_4 + 2CrO_5 + 5H_2O$$

Answer: C

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7. H_2O_2 is

A. Lighter than water

B. Denser than water

C. More viscous than water

D. Less viscous than water

Answer: B::C

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8. Radio-activity can be detected in hydrogn due to the presence of

A. ${}_1^1 H$

B. ${}_1^2 H$

C. ${}_{1}^{3}H$

D. He

Answer: C

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9. The soaps contain salts of higher fatty acids like

A. Stearic acid

B. oxalic acid

C. Palmitic acid

D. Oleic acid

Answer: A::C::D

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10. Chemical additive which can be used to remove water hardness is

A. $Na_2\left[Na_4(PO_3)_6\right]$

B. $Ca(OH)_2$

C. $Na_2CO_3 \cdot 10H_2O$

D. $CaCO_3$

Answer: A::B::C

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11. $Ca(OH)_2$ remoes temporary hardness by forming

A. $CaCl_2$

B. $CaSO_4$

C. $CaCO_3$

D. $MgCO_3$

Answer: C::D

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12. In ortho H_2 the correct statement/s is/are

A. The two nuclei have same spin

B. The two nuclei have oppsite spin

C. The two electrons have same spin

D. The two electrons have opposite spin

Answer: A::D

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13. Consider the following reversible conversion:

$\text{Ortho}(H_2) \Leftrightarrow \text{Para} \ \ (H_2)$

this equilibrium will shift in forward direction

A. On increasing temperature

B. On increasing ortho concentration

C. On decreasing temperature

D. On decreasing ortho concentration

Answer: B::C

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14. H_2O_2 can act as

A. oxidising agent

B. Reducing agent

C. Bleaching agent

D. Acid

Answer: A::B::C::D

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15. Correct among the following is/are

A. Ortho hydrogen is thermodynamically more stable

B. Parahydrogen is kinetically more stable

C. At room temperature para hydrogn is major component

D. Ortho and para hydrogens always present in 50:50 ratio

Answer: A::B

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Assignment Section D

1. Heavy water is the oxide of heavy hydrogen (deuterium) and is also called deuterium oxide. It is represented as D_2O. Heavy water is chemically similar to ordinary water heavy water is used for the neutron moderatory, as a trracer compound and for the preparation of deuterium. Reaction of heavy water with alkali metals liberates heavy hydrogen. heavy water can also be used for exchanging labile hydrogen with deuterium completely or

partially. heavy water reacts slower than ordinary water but forms stronger bonds with other elements as compared to hydrogen.

Q. The products of the reaction $Al_4C_3 + D_2O \rightarrow$ ___ is

A. $DC \equiv CD$

B. CD_4

C. $Al(OD)_3$

D. Both 2 and 3

Answer: D

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2. Heavy water is the oxide of heavy hydrogen (deuterium) and is also called deuterium oxide. It is represented as D_2O. Heavy

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Q. Reaction of N_2O_5 and D_2O produces

A. DNO_3

B. DNO_2

C. NO

D. NO_2

Answer: A

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3. Heavy water is the oxide of heavy hydrogen (deuterium) and is also called deuterium oxide. It is represented as D_2O. Heavy water is chemically similar to ordinary water heavy water is used for the neutron moderatory, as a trracer compound and for the preparation of deuterium. Reaction of heavy water with alkali metals liberates heavy hydrogen. heavy water can also be used for exchanging labile hydrogen with deuterium completely or partially. heavy water reacts slower than ordinary water but forms stronger bonds with other elements as compared to hydrogen.

Q. Which property of heavy water is lesser in magnitude as that compared with normal water?

A. Molecular mass

B. Density

C. Boiling point

D. Ionisation constant

Answer: D

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4. Size of neucleus increases from protium to tritium so in $H_2, D_2 \& T_2$ area off overlapping also increases in the same order.

Q. Which overlapping is responsible for bond formation in H_2, D_2, T_2 respectively?

A. 1s-1s in each

B. 2s-2s in each

C. 1s-2s in each

D. 1s-2s I T_2, 1s-1s in rest

Answer: A

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5. Size of neucleus increases from protium to tritium so in $H_2, D_2 \& T_2$ area off overlapping also increases in the same order.

Q. $H_2, D_2 \& T_2$ show their bond-enthalpies as

A. $H_2 = D_2 = T_2$

B. $H_2 > D_2 > T_2$

C. $H_2 < D_2 < T_2$

D. $D_2 < H_2 < T_2$

Answer: C

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Assignment Section E

1. Statement-1: H_2O_2 liberates O_2 when it reacts with acidified $KMnO_4$ solution

Statement-2: $KMnO_4$ oxidised H_2O_2 to O_2.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: A

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2. Statement-1: The $O-O$ bond length in H_2O_2 is longer than that of O_2F_2.

Statement-2: H_2O_2 is a polar covalent molcule.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: B

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3. Statement-1: Complete hydrolysis of one mole of peroxydisulphuric acid gives one mole of H_2O_2 and moles of H_2SO_4.

Statement-2: Peroxydisulphuric acid has one peroxy linkage.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: A

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4. Statement-1: Zinc hydroxide dissolves in excess of $NaOH$ solution to evolve dihydrogen gas.

Statement-2: Zinc hydroxide is amphoteric in nature.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: D

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5. Statement-1: Hydrogen gas is liberated by the action of aluminium with a concentrated solution of NaOH

Statement-2: Aluminium with NaOH forms sodium metaaluminate.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: B

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6. Statement-1: Wit non-metals covalent hydrides are formed.

Statement-2: For covalent hydrides electronegativity difference should be less.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: A

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7. Valence factor of H_2O_2 is always 2.

Statement-2: In redox reaction change of oxidation state per molecule is 2.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: D

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Assignment Section F

1. Match the following

Column-I	Column-II
(A) Ionic hydride	(p) Salt like structure
(B) Covalent hydride	(q) Polymeric structure
(C) Interstitial hydride	(r) Stoichiometric
(D) Intermediate hydride	(s) Non-stoichiometric

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2. Match the following

Column-I	Column-II
(A) $Ca(HCO_3)_2$	(p) Cause of permanent hardness in water
(B) $MgCl_2$	(q) Used for removal of hardness of water
(C) $CaSO_4$	(r) Does not exist in crystalline state
(D) $(NaPO_3)_6$	(s) Ionised in water
	(t) Can be removed from water by using washing soda

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3. Match the following

Column-I	Column-II
(A) $H^{\cdot}$	(p) Cation of hydrogen
(B) H	(q) Free radical
(C) H_2	(r) Hydrogen
(D) H^-	(s) Anion of hydrogen
	(t) Proton

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Assignment Section G

1. In liquid water, the number of H_2O molecules surrounded to one H_2O molecule are____.

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2. When H_2O_2 is decomposed to O_2 gas, it n_{factor} is____.

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Assignment Section H

1. Statement-1: H_2O_2 is more polar than H_2O

Statement-2: D_2O has higher boiling point than H_2O

Statement-3: H_2 bond bond energy is less than D_2.

A. TTT

B. TTF

C. TFF

D. FFT

Answer: A

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2. Statement-1: Tritium is radioactive form of hydrogen.

statement-2: NaCl is more soluble in water as compared to D_2O

.

Statement-3: pH of water depends on temperature.

A. TTT

B. TTF

C. TFF

D. FFF

Answer: A

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3. Statement 1: Highest adsorption tendency of H is on Pt.

Statement-2: In H_2, protium is 99% by mass.

statement 3: $H_2 \& O_2$ react only under vigorous conditions

A. TFT

B. FTT

C. TTF

D. FFT

Answer: A

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Assignment Section I

1. How many grams of barium hydride must be treated with water to obtain 4.36L of hydrogen at $20^\circ C$ and 0.975 atm pressure (Ba=137)?

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2. When a substance A reacts with water it produces a combustible gas B and a solution of substance C in water. When another substance D reacts with this solution of C, it also produces the same gas B on warming but D can produce gas B on reaction with dilute sulphuric acid at room temperature. A imparts a deep golden yellow colour a smokeless flame to Bunsen burner. A,B,C, and D respectively are :

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3. An element X reacts with H_2 gas at $200^\circ C$ to form compound Y. when Y is heated to a higher temperature, it decomposes to element X and H_2 gas in the ratio of 559 ml of H_2 (measured at STP) for 1.00 g of X reacted. X also combines

with Cl_2 to form a compound Z which contains 63.89 peerrcent mass of chlorine. identify X, Y and Z.

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4. Hydrogen perioxde acts both as an oxidising agent and as reducing agent in alkaline solution towards certain first row transition metal ions. Iiustrate both these properties of H_2O_2 using chemical equation.

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5. Give reasons in one or two sentences for the following: The mixture of hydrazine and hydrogen peroxides with a copper (II) catalyst is used as a rocket propellant.

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6. To a 25 mL H_2O_2 solution excess of an acidified solution of potassium iodide was added. The iodine liberated required 20 " mL of " 0.3 N sodium thiosulphate solution Calculate the volume strength of H_2O_2 solution.

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7. 1 mega litre water (density 1g/cc) needs 106 kg of Na_2CO_3 for removal of its permanent hardness. Determine its hardness in the multiples of 20 ppm.

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Assignment Section J

1. Order of bond length can be given as

A. $H_2 = D_2 = T_2$

B. $H_2 < D_2 < T_2$

C. $H_2 > D_2 > T_2$

D. $D_2 < H_2 < T_2$

Answer: C

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2. Incorrect among the following

A. H^+ exist in water as $H^+(H_2O)_n$

B. H^- exist in water as $H^-(H_2O)_n$

C. $\Delta_{hyd}H^{\Theta}_{(H^+)} = \Delta_{hyd}H^{\Theta}_{(H^-)}$ (hyd $\equiv$ hydration)

D. H exist in water as $H.\ (H_2O)_n$

Answer: C::D

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3. Not incorrect among the following

A. $N_2 \& H_2$ are two non-reacting gases

B. $O_2 \& H_2$ are two non-reacting gases

C. $N_2 \& D_2$ are reactive towards each other

D. $D_2 \& O_2$ are non-reactive to each other

Answer: C

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4. Which of the following reactions is defines $\Delta_f H^{\Theta}$?

A.

B.

C.

D.

Answer:

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5. Correct regarding bond-strength is

A. $C-H>C-D>C-T$

B. $C-H<C-D<C-T$

C. $C-T<C-D=C-H$

D. $C - D > C - H = C - T$

Answer: B

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Examples

1. On the basis of electron affinity, comment on the resemblance of hydrogen with halogens.

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2. Which isotope of hydrogen is radioactive ?

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3. Which isotope of hydrogen contains equal number of protons and neutrons ?

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4. Comment on the reaction dihydrogen with fluorine.

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5. Explain the use of hydrogen in the formation of vegetable fats.

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6. Which class of covalent hydrides are considered as lewis acids?

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7. Association of molecules in water is due to:

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8. Describe the nature of ionic hydrides.

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9. Why do alcohol (a covalent compound) dissolves in water (ionic)?

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10. Which properties of hydrogen as responsible for moderation of the climate and body temperature of living beings?

Watch Video Solution

11. Compare the density of ice and water.

Watch Video Solution

12. Does water gets oxidised in the process of photosynthesis?

Watch Video Solution

13. What type of water forms scum with soap?

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14. Write the reaction that takes place on adding lime to water containing magnesium bicarbonate.

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15. Explain with the help of reactions that how heavy water is used in the preparation of deuterium compounds?

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16. What is calgon?

Watch Video Solution

17. Calculate the strength of 30 volume solution of hydrogen peroxide.

Watch Video Solution

18. What is the percentage strength of a solution of 100 volume H_2O_2?

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19. Why H_2O_2 is kept away from dust?

Watch Video Solution

20. $PbS(s) + 4H_2O_2(aq) \rightarrow PbSO_4(s) + 4H_2O(l)$

In the above reaction, H_2O_2 acts as a/an____agent.

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Exercise

1. What is the half life period of tritium ?

A. 13.33 year

B. 12.33 year

C. 12 years

D. 22.33 years

Answer: B

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2. $Zn + 2NaOH \rightarrow A + B$

A. NaH and H_2

B. Na_2Zn and H_2

C. Na_2ZnO_2 and H_2

D. Reaction arely occurs

Answer: C

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3. Which element from electron rich hydride ?

A. C

B. O

C. B

D. Al

Answer: B

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4. The formula of Calgon is :

A. $Na_6P_6O_{18}$

B. $Na_5P_5O_{18}$

C. $Na_4P_4O_{18}$

D. $Na_2MP_6O_{18}$

Answer: A

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5. What is the amount of O_2 liberated at STP by "30 volume" 1 L solution of H_2O_2?

A. 1.5 L

B. 2.5 L

C. 30 L

D. 3 L

Answer: C

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6. Among the following which islare interstitial hydride ?

A. LaH_3

B. CaH_2

C. NaH

D. HF

Answer: A

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7. Among the following in which hydrates H_2O molecules only occupy the interstitial site

A. $BaCl_2 2H_2O$

B. $\left[\left[Ni(H_2O)_6\right]^{2+}\right]\left(NO_3^-\right)_2$

C. $CuSO_4 5H_2O$

D. All of these

Answer: A

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8. In which of the following property hydrogen does not resemble with halogen:

A. Hydrogen has strong affinity for non-metals

B. Hydrogen has high ionisation potential

C. Hydrogen has low value of electron affinity

D. Hydrogen acts as reducing agent

Answer: B

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9. Which of the following is electron precise hydride ?

A. BH_3

B. CH_4

C. H_2O

D. HF

Answer: B

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10. Demineraisled H_2O is obtained when

A. Water is passed through $R - SO_3H$ resin

B. Water is passed through $R - \overset{+}{N}H_3\overset{\Theta}{O}H$ resin

C. Water is passed through both RSO_3H resin and $R\overset{\oplus}{N}H_3O\overset{\Theta}{H}$ resin

D. We can't get demineralised H_2O artificially by resins

Answer: C

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Assignment Section A Objective Type Question

1. The ionisation energy of hydrogen is high as compared to alkali metals because of

A. One electron in outemost shell

B. Small size

C. One proton in its nucleus

D. No neutron

Answer: B

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2. Which of the following is the correct statement ?

A. Hydrogen has the same I.E. as that of alkali metals

B. Hydrogen has strong tendency to gain one electron same as that of alkali metals

C. Hydrogen molecules is diatomic so are the halogens

D. Electron affinity of hydrogen is same as that of halogens

Answer: C

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3. The isotope of hydrogen which is radioactive is

A. Protium

B. Tritum

C. Deuterium

D. Neutron

Answer: B

Watch Video Solution

4. Hydrogen accepts an electron to form inert gas configuration. In this it resembles

A. Halogens

B. Alkali metals

C. Transition metals

D. Chalcogens

Answer: A

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5. Hydrogen acts as a reducing agent and thus resembles

A. Halogens

B. Noble gas

C. Radioactive elements

D. Alkali metals

Answer: D

Watch Video Solution

6. Which position for hydrogen explain all its properties ?

A. At the top of halogens

B. At the top of alkali metals

C. At the top of chalcogens

D. Both (1) & (2)

Answer: D

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7. Ionisation energy of hydrogen is

A. Fqual to that of fluorine

B. Lower thean that of ffluorine

C. Slightly highher than that of fluorine

D. Much highher than that of fluorine

Answer: B

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8. Which of the following statements concerning protium, deuterium and tritium is not true ?

A. They are isotopes of each other

B. They have similar electronic configurations

C. They exist in the nature in the ratio of 1 : 2 : 3 respectively

D. Their mass numbers are in the ratio 1 : 2 : 3 respectively

Answer: C

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9. Number of nucleons in D_2 molecule is

A. 1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

10. Water gas is

A. $CO + H_2$

B. $CO_2 + H_2$

C. $CO + H_2O$

D. $CO_2 + N_2$

Answer: A

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11. The catalyst used in the water-gas shift reaction is

A. Sodium arsenite

B. Nickel

C. Potassium permanganate

D. Iron chromate

Answer: D

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12. The reaction between which of the following reactants produces hydrogen?

A. Zn + HCl

B. $BaO_2 + HCl$

C. $K_2S_2O_8 + H_2O$

D. $Na_2O_2 + HCl$

Answer: A

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13. High purity dihydrogen is obtained by electrolysing

A. Warm aqueous barium hydroxide

B. Brine solution

C. Acidified sulphate solution

D. Water gas

Answer: A

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14. Hydrogen is not obtained when sodium reacts with

A. Cold water

B. Dilute H_2SO_4

C. Molten NaCl

D. Dilute HCl

Answer: C

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15. The process by which ammonia is formed from nitrogen and hydrogen is

A. Contact process

B. Haber process

C. Ostwald process

D. Hydrogenation process

Answer: B

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16. Hydrogenation of alkenes yields

A. Alkanes

B. Alkynes

C. Aldehydes

D. Carboxylic acids

Answer: A

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17. Ionic hydrides are usually

A. Good conductors of electricity in solid state

B. Stoichiometric compounds

C. Volatile

D. Non-crystalline

Answer: B

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18. Group 2 hydrides with significant covalent character is/are

A. BeH_2

B. MgH_2

C. CaH_2

D. Both (1) & (2)

Answer: D

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19. In which of the compounds does hydrogen have an oxidation state of -1 ?

A. CH_4

B. NH_3

C. HCl

D. CaH_2

Answer: D

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20. The $H-O-H$ angle in water molecule is about

A. 90°

B. 180°

C. $109^\circ 28$

D. 104.5^2

Answer: D

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21. Hardness of water cannot be removed by

A. Treating with washing soda

B. Boiling

C. Adding calgon

D. Addition of chlorine

Answer: D

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22. Temporary hardness may be removed from water adding.

A. $CaCO_3$

B. $Ca(OH)_2$

C. $CaSO_4$

D. HCl

Answer: B

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23. Permanent hardness of water is due to the presence of

A. Sulphates of Mg and Ca

B. Bicarbonates of mg and Ca

C. Sulphates of Na and K

D. Bicarbonates of Na and K

Answer: A

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24. Permanenet hardness of water is removed by adding

A. Sodium bicarbonate

B. Washing soda

C. Calcium hydroxide

D. Sodium chloride

Answer: B

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25. Pemunt is chemically.

A. Hydrated sodium aluminium silcate

B. Sodium hexaphosphate

C. Sodium bicarbonate

D. Calcium hydroxide

Answer: A

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26. In Clark's process for removing hardness of water, the reagent used is

A. Acidic

B. Basic

C. Neutral

D. Both (1) & (2)

Answer: B

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27. Heavy water is

A. De-mineralised water

B. De-ionized water

C. Qrdinary water contaning dissolved saits of heavy metals

D. The compounds of heavier isotope of hydrogen with oxygen (D_2O_2)

Answer: D

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28. The structure of H_2O_2 is

A. Open book like

B. Closed book like

C. Pyramidal

D. Linear

Answer: A

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29. The dihedral angle of H_2O_2 in solid phase is

A. 111.5°

B. 90.2°

C. 94.8°

D. 101.9°

Answer: B

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30. The volume of O_2 liberated from 0.96g of H_2O_2 is

A. 224.6 mL

B. 316.2 mL

C. 390.0 mL

D. 112.5 mL

Answer: B

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Assignment Section B Objective Type Question

1. H_2O_2 can act as

A. Oxidising agent

B. Reducing agent

C. Bleaching agent

D. All of these

Answer: D

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2. Hydrogen can be prepared by

A. Electrolysis of acidified water

B. Bosch's process

C. Lane's process

D. All of these

Answer: D

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3. Commercial hydrogen is obtained from

A. Coal gas

B. Water gas

C. Air

D. Producer gas

Answer: B

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4. Which is a sources of nascent hydrogen?

(i) Zn + dil HCl

ii $CH_3OH + Na$

(iii) Electrolysis of H_2O

(iv) Silent electric discharge of H_2O_2

A. I & II

B. II & III

C. I, II, III

D. IV

Answer: A

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5. Electrolysis of 50% H_2SO_4 gives

A. H_2O

B. D_2O

C. H_2O_2

D. H_2

Answer: C

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6. Lane's process is for the preparetion of

A. H_2

B. H_2O

C. H_2O_2

D. D_2O

Answer: A

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7. In water gas shift reaction reactant is

A. $H_2 + H_2O$

B. $H_2 + CO_2$

C. $H_2 + CO + H_2O(g)$

D. $H_2 + D_2$

Answer: C

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8. In Ortho and Para hydrogen, the nuclear spin respectively are

A. Parallel and opposite

B. Opposite and parallel

C. It may be parallel or opposite

D. They do not differ in nuclear spin

Answer: A

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9. When hydrolith is treated with water it yields

A. H_2

B. H_2O_2

C. NaH

D. N_2

Answer: A

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10. Interstital hydrides are formed by

A. s-block metals

B. p-block metals

C. d-block metals

D. All of these

Answer: C

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11. The group of elements responsible for hydride gap

A. Mn, Ca, Ni

B. Mn, Fe, Li

C. Mn, Fe, Co

D. Mn, Cu, Cl

Answer: C

Watch Video Solution

12. Which of the following is interstitial hydride?

A. CaH_2

B. CuH

C. PH_3

D. NaH

Answer: B

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13. Hydrogen exists in atomic state in which of the following compounds?

A. Metallic hydrides

B. Ionic hydride

C. Molecular hydrides

D. H_2O

Answer: A

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14. The velocity of neutrons in nuclear is slowed down by

A. Heavy water

B. Ordinary water

C. Zinc rod

D. Fused caustic soda

Answer: A

Watch Video Solution

15. Heavy water has maximum density at

A. $4^\circ C$

B. $11.6^\circ C$

C. $O^\circ C$

D. 273 K

Answer: B

Watch Video Solution

16. Heavy water is

A. H_2O

B. D_2O

C. Water at $4^\circ C$

D. Water obtained by repeated distillation

Answer: B

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17. Which of the following will determine whether the given colourless liquid is water or not ?

A. Melting

B. Tasting

C. Phenolphthalein

D. Adding a pinch of anhydrous $CuSO_4$

Answer: D

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18. Selecte the correct statement.

A. O-H bond is stronger than O-D bond

B. O-H bond is weaker than O-D bond

C. Permanent hardness of water is due to the presence of bicarbonates of calcium and magnesium

D. O-H and O-D bond strenght is same

Answer: B

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19. Heavy water is called as heavy because it is

A. A heavy liquid

B. An oxide of heavier isotope of oxygen

C. An oxide of deuterium

D. Less denser than H_2O

Answer: C

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20. Blue vitriol has

A. Coordinate bond

B. Covalent bond

C. Hydrogen bond

D. All of these

Answer: D

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21. Both cation and impurities can be removed from hard water by using

A. Zeolites

B. Organic ion exchanges

C. Calgon

D. All of these

Answer: B

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22. Which of the following is correct?

A. LiH is thermally more stable than CsH

B. Density of H_2 is about $\frac{1}{14}$th of that of air

C. Atomic hydrogen is much more reactive than ordinary hydrogen

D. All of these

Answer: D

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23. When the same amount of zinc is treated separately with excess of sulphric acid and excess of sodium hydroxide, the ratio of volume of hydrogen evolved is

A. $1:1$

B. $1:2$

C. $2:1$

D. $9:4$

Answer: A

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24. $CH_3D + Cl_2 \xrightarrow[(1\ \text{mole})]{\text{hv}}$ Product

The product is

A. CH_2DCl

B. CH_3Cl

C. $CDCl_3$

D. CCl_4

Answer: A

Watch Video Solution

25. Hydrogen peroxide is used as

A. Oxidising agent only

B. Reducing agent only

C. Both as oxidising and reducing agent

D. Drying agent

Answer: C

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26. H_2O_2 is manufactured these days

A. By the action of H_2O_2 on BaO

B. By the action of H_2SO_4 on Na_2O

C. By electrolysis of 50% H_2SO_4

D. By burning hydrogen in excess of oxygen

Answer: C

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27. Which of the following is most reactive ?

A. H_2

B. H (nascent)

C. D_2

D. H (atomic)

Answer: D

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28. H_2O_2 restores the colour of old lead paintings, blackened by the action of H_2S gas by :

A. Converting PbO_2 to Pb

B. Oxidising pbS to $PbSO_4$

C. Converting $PbCO_3$ to Pb

D. Oxidising $PbSO_3 \rightarrow PbSO_4$

Answer: B

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29. In the reaction

$2K_3\left[Fe(CN)_6\right] + 2KOH + H_2O_2 \rightarrow$

$2K_4\left[Fe(CN)_6\right] + 2H_2O + O_2$

H_2O_2 acts as

A. Reducing agent

B. Oxidising agent

C. Knocking agent

D. Bleaching agent

Answer: A

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30. Decomposition of H_2O_2 can be slowed down by addittion of smass amount phosphoric acid which act as

A. Stopper

B. Inhibitor

C. Detainer

D. Promotor

Answer: B

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31. When 50% solution of H_2SO_4 is electrolysed by passing a current of high density at low temperature the main products of electrolysis are:

A. Oxygen & Hydrogen

B. H_2 and peroxy disuphuric acid

C. H_2 and SO_2

D. O_2 and peroxy disulphuric acid

Answer: B

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32. $H_2O_2 \rightarrow H_2O + O_2$

This represents

A. Oxidetion of H_2O_2

B. Reducton of H_2O_2

C. Disproportionation of oxygen

D. Acidic nature of H_2O_2

Answer: C

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33. 20 volume hydrogen peroxide means

A. 1 ml of H_2O_2 solution gives 20 L of O_2 at NTP

B. 1 mole of H_2O_2 solution gives 20 L of O_2 at NTP

C. 1 g of H_2O_2 give 20 ml of O_2 at NTP

D. 1 ml of H_2O_2 solution give 20 ml of O_2 at NTP

Answer: D

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34. 1 ml of H_2O_2 solution given 10 ml of O_2 at NTP. It is :

A. $10 vol H_2O_2$

B. 20 vol H_2O_2

C. 30 vol H_2O_2

D. 40 vol H_2O_2

Answer: A

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35. Volume strength of H_2O_2 labelled is $10vol.$ What is normality of H_2O_2?

A. 2.1

B. 3.4

C. 1.7

D. 5.1

Answer: C

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36. The amount of H_2O_2 present in 1 L of $1 \cdot 5NH_2O_2$ solution is

A. 2.5 g

B. 25.5 g

C. 3.0

D. 8.0

Answer: B

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37. H_2O and H_2O_2 resemble in

A. Hybridisation of oxygen

B. Oxidation state of oxygen

C. Structure

D. Bond angle

Answer: A

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38. Bolling point of D_2O is

A. 100° C

B. 105.5° C

C. 101.4° C

D. 102.6° C

Answer: C

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Assignment Section C Previous Type Questions

1. Which of the following statements about hydrogen is incorrect ?

A. Dithydrogen does not act as a reducing agent

B. Hydrogen has three isotopes of which tritium is the most common

C. Hydrogen never acts as cation in ionic salts

D. Hydronium ion, H_3O^+ exists freely in solution

Answer: A::B

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2. In acidic medium, H_2O_2 changes $Cr_2O_7^{2-}$ to CrO_5 which has two (-O-O-) bonds. Oxidation state of Cr in CrO_5 is

A. $+5$

B. $+3$

C. $+6$

D. -10

Answer: C

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3. The ease of adsorption of the hydrated alkali metal ions on ion-exchange resins follows the order:

A. $K^+ < Na^+ < Rb^+ < Li^+$

B. $Na' < Li^+ < K' < Rb^+$

C. $Li^+ < K^+ < Na^+ < Rb^+$

D. $Rb^+ < K^+ < Na^+ < Li^+$

Answer: C

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4. Some statements about heavy water are given below :

(i) Heavy water is used as a moderator in nuclear reactors

(ii) Heavy water is more associated than ordinary water.

(iii) Heavy water is more effective solvent than ordinary water

Which of the above statments are correct ?

A. a and b

B. a, b and c

C. b and c

D. a and c

Answer: A

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5. Hydrogen is prepared from H_2O by adding

A. Ca, which acts as reducing agent

B. Al. which acts as oxidising agent

C. Ag. Which acts as reducing agent

D. Au. Which acts as oxidising agent

Answer: A

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6. The hydride ion H^- is a stronger base than its hydroxide ion OH^-. Which of the following reactions will occurs if sodium hydride (NaH) is dissolved in water ?

A. $H^- + H_2O \rightarrow$ No rection

B. $H^-(aq) + H_2O \rightarrow H_2O$

C. $H^-(aq) + H_2O(l) \rightarrow OH^- + H_2$

D. None of these

Answer: C

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7. Which of the following statements about the interstitial compounds is incorrect?

A. They are chemically reactive

B. They are much harder than the pure metal

C. They have higher meting points than the pure metal

D. They retain metallic conductivity

Answer: A

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8. The volume strength of $1 \cdot 5$ N H_2O_2 solution is

A. 8.8

B. 8.4

C. 4.8`

D. 5.2

Answer: B

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9. Which one of the following pairs of substances on reaction will not not evolve H_2 gas?

A. Coppar and HCl (aqueous)

B. Iron and steam

C. Iron and H_2SO_4 (aqueous)

D. Sodium and ethyl alcohol

Answer: A

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10. Zn gives H_2 gas with H_2SO_4 and HCl but not with HNO_3 because

A. Zn act as oxidizing agent when react with HNO_3

B. HNO_3 is weaker acid than H_2SO_4 and HCl

C. In electrochemical series Zn is above hydrogen

D. NO_3^{θ} is reduced in preference to hydronium ion

Answer: D

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11. The pair that yields the same gaseous product on reaction with water :

A. K and KO_2

B. Ba and BaO_2

C. Ca and CaH_2

D. Na and Na_2O_2

Answer: C

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12. Ortho and para-hydrogen differ in the

A. Proton spin

B. Electron spin

C. Nuclear charge

D. Nuclear reaction

Answer: A

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13. Action of water or dilute mineral acids on metals can give

A. Monohydrogen

B. Tritium

C. Dihydrogen

D. Trihydrogen

Answer: C

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14. Deuterium resembles hydrogen in chemical properties but reacts

A. More vigorously than hydrogen

B. Faster than hydrogen

C. Slower than hydrogen

D. Just as hydrgen

Answer: C

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15. Spin isomerism is shown by

A. Dichloro benzene

B. Hydrogen

C. Dibasic acid

D. n-butane

Answer: B

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16. Hydrogen can be fused to form helium at

A. High temperature and high pressure

B. High temperature and Low pressure

C. Low temperature and high pressure

D. Low temperature and low pressure

Answer: A

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17. What is formed when calcium carbide reacts with heavy water?

A. C_2D_2

B. CaD_2

C. Ca_2D_2O

D. CD_2

Answer: A

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18. The maximum possible number of hydrogen bonds in which an H_2O molecule can participate is

A. 1

B. 2

C. 3

D. 4

Answer: D

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19. In which of the following reaction hydrogen peroxide is a reducing agent

A. $2FeCl_2 + 2HCl + H_2O_2 \rightarrow 2FeCl_3 + 2H_2O$

B. $Cl_2 + H_2O_2 \rightarrow 2HCl + O_2$

C. $2Hl + H_2O_2 \rightarrow 2H_2O + l_2$

D. $H_2SO_3 + H_2O_2 \rightarrow H_2SO_4 + H_2O$

Answer: B

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20. There is a smaple of 10 volume of hydrogen peroxide solution . Calculate its strength.

A. $3.00\ \%$

B. $4.045\ \%$

C. $2.59\ \%$

D. $3.035\ \%$

Answer: D

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21. In lab H_2O_2 is prepared by

A. Cold $H_2SO_4 + BaO_2$

B. HCl + BaO_2

C. Conc $H_2SO_4 + Na_2O_2$

D. $H_2 + O_2$

Answer: A

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22. H_2O_2 acts as an oxidising agent in

A. Acidic medium only

B. Alkaline medium only

C. Neurtral medium only

D. Acidic and alkaline medium

Answer: D

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23. Hydrogen peroxide is reduced by

A. Ozone

B. Barium peroxide

C. Acidic solution of $KMnO_4$

D. Lead sulphide suspension

Answer: D

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24. The volume of oxygen liberated from $15ml$ of 20 volume H_2O_2 is

A. 250 ml

B. 300 ml

C. 150 ml

D. 200 ml

Answer: B

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25. The volume of oxygen liberated from $0.68g$ of H_2O_2 is

A. 112 ml

B. 224 ml

C. 56 ml

D. 336 ml

Answer: B

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26. 20 volume H_2O_2 solution has a strength of about

A. 0.3

B. 0.06

C. 0.03

D. 0.1

Answer: B

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27. The H - O - O bond angle in H_2O_2 (g) is

A. 107.28°

B. 109.28°

C. 104.5°

D. 94.8°

Answer: D

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Assignment Section D Assertion Reason Type Question

1. A : ScH_2 is an example of ionic hydride.

R : All metal forms ionic hydride.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: D

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2. A : Temporary hardness is due to HCO_3^- ions.

R : permanent hardness is due to $CaCl_2$

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: B

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3. A : The molarity of 20 volume H_2O_2 is 3.58 M.

R : Volume strengh $= 5.6 \times$ M.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: D

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4. A : Permanent hardness of water is due to the presence of chlorine or sulphates of Ca or Mg.

R : Permanent hardness is removed by boiling

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: C

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5. A : Atomic hydrogen is more reactive than naxcent hydrogen.

R : The energy content of atomic hydrogen is more than nascent hydrogen,

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: A

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6. Assertion (A) The O-O bond length in H_2O_2 is shorter than that in O_2.

Reason (R) H_2O_2 is ionic compound.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: D

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7. A : H_2O_2 reacts with $K_2Cr_2O_7$ to give blue colour.

H_2O_2 can act as reducing agent.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: B

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8. A : Water is a poor solvent for non polar compounds.

R : Covalent compounds interact weakly that even van der Wall forces cannot be broken.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: A

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9. A : Zn dissolve in excess of NaOH solution so as to give H_2

R : $Zn(OH)_2$ is neutral is nature.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: C

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10. A : Complete hydrolysis of one mole of peroxydi-sulphuric acid gives one omle of H_2O_2 and 2 mole H_2SO_4.

R : Peroxydisulphuric acid has zero peroxy lingage.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: C

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11. A : H_2O liberate O_2 an reaction with $KMnO_4$ in acidic medium.

R : $KMnO_4$ oxidises H_2O_2 to O_2.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: A

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12. Statement-1: Hydrogen gas is liberated by the action of aluminium with a concentrated solution of NaOH

Statement-2: Aluminium with NaOH forms sodium metaaluminate.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: B

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13. A : pH of water termperature dependent.

R : Boiling water has pH less than 7.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: B

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14. A : H_2O_2 decomposes on exposure to light.

R : It is stored in dark waxlined plastic vessel.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: B

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15. A : Dihedral angle of H_2O_2 in gas phase is greater than in solid phase.

R : H_2O_2 has planar structure.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)

B. If both Assertion & Reason are true but the reason is not the correct explanantion of the assertion, then mark (2)

C. If assertion is true statements but Reason is false, then mark (3)

D. If both Assertion and Reason are false statements, then mark (4)

Answer: C

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