

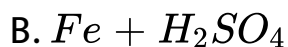
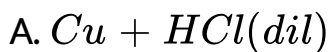
CHEMISTRY

BOOKS - A2Z CHEMISTRY (HINGLISH)

HYDROGEN

Position Of Hydrogen Atom In The Periodic Table

1. Which of the following pairs will not produce dihydrogen gas ?



C. Mg + steam

D. Na + alcohol

Answer: A



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2. 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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3. Water cannot act as :

A. oxidant

B. hydrolytic agent

C. hydrogenating agent

D. reductant

Answer: C

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4. Ortho-hydrogen and para-hydrogen resemble in which of the following property

- A. Thermal conductivity
- B. Magnetic properties
- C. Chemical properties
- D. Heat capacity

Answer: C



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5. Which element forms maximum compound in chemistry ?

A. *O*

B. *H*

C. *Si*

D. *C*

Answer: b



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6. One of the following is an incorrect statement. Point out the incorrect one.

A. H_2O_2 decomposes rapidly in presence of MnO_2

- B. Ice at its melting point is lighter than water because ice crystals have hollow hexagonal arrangement of H_2O molecules
- C. D_2O will have maximum density at $11.5^\circ C$.
- D. Water gas contains greater proportion of CO than that of H_2

Answer: D

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7. Which of the following produces hydrolith with dihydrogen ?

A. *Mg*

B. *Al*

C. *Cu*

D. *Ca*

Answer: D



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8. Hydrogen has the tendency to gain one electron to acquire helium configuration, in this respect, it resembles:

A. Halogen

B. Alkali metals

C. Chalcogens

D. Alkaline earth metals

Answer: A



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9. Hydrogen molecule differs from chlorine molecule in the following respect :

A. hydrogen molecule is non – polar but chlorine molecule is polar.

B. hydrogen molecule is polar while chlorine molecule is non – polar.

C. hydrogen molecule can form intermolecular hydrogen bonds but chlorine molecular does not.

D. hydrogen molecule cannot participate in coordinate bond formation but chlorine molecule can.

Answer: d

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10. Hydrogen is :

- A. electropositive
- B. electronegative
- C. both electropositive and electronegative
- D. neither electropositive nor electronegative.

Answer: C



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11. The property of hydrogen which distinguishes it from alkali metals is

- A. Its electropositive character
- B. Its affinity for non – metal

C. Its reducing character

D. Its non – metallic character

Answer: D



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12. The possible form of H_2 molecule on the basis of three isotopes can be :

A. 3

B. 6

C. 9

D. 12

Answer: b



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13. 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 neutron
- D. 1 electron, 1 proton, 3 neutrons

Answer: c



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14. What is the sum of protons, electrons and neutrons in the heaviest isotope of hydrogen?

A. 6

B. 5

C. 4

D. 3

Answer: c



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Section A Hydrogen

1. In all its properties, hydrogen resembles :

A. alkali metals only.

B. halogens only.

C. both alkali metals and halogens.

D. neither alkali metals nor halogens.

Answer: d



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Hydrogen Gas

1. What is the sum of protons, electrons and neutrons in the lightest isotope of hydrogen?

A. 3

B. 5

C. 2

D. 6

Answer: C



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2. In context with the industrial preparation of hydrogen from water gas ($CO + H_2$), which of the following is

the correct statement ?

- A. CO is oxidised to CO_2 with steam in the presence of a catalyst followed by absorption of CO_2 in alkali
- B. CO and H_2 are fractionally separated using difference in their densities
- C. CO is removed by absorption in aqueous Cu_2Cl_2
- D. CO is removed by absorption in aqueous $Cu_2Cl(2)$

Answer: a



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3. Abundance of H_2 in the earth's atmosphere is very small. This is because

A. The earth's gravitation fiels is too small to hold so light an element.

B. H_2 exists in ortho and para form

C. H_2 is diatomic gas

D. H_2 is not a metal

Answer: d



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4. Hydrogen directly combines with

A. *Au*

B. *Cu*

C. *Ni*

D. *Ca*

Answer: d



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5. Hydrogen does not combine with

A. helium

B. bismuth

C. antimony

D. sodium

Answer: A

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6. 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 ration 1 : 2 : 3.
- D. Their atomic masses are in the ration 1 : 2 : 3.

Answer: c



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7. Pick out the correct statement

A. By decreasing the temperature pure para –
hydrogen can be obtained

B. By increasing the temperature pure ortho –
hydrogen can be obtained

C. By decreasing the temperature pure ortho –
hydrogen can be obtained

D. By increasing the temperature pure para –
hydrogen can be obtained

Answer: b



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8. The ratio C_p / C_v for H_2 is

A. 1.40

B. 1.67

C. 1.33

D. None of these

Answer: a



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9. Among CaH_2 , NH_3 , NaH and B_2H_6 which are covalent hydrides?

- A. NH_3 and B_2H_6
- B. NaH and CaH_2
- C. NaH and NH_3
- D. CaH_2 and B_2H_2

Answer: A



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10. Which one is not an isotope of hydrogen ?

- A. Tritium
- B. Deuterium
- C. Ortho hydrogen
- D. None of these

Answer: C



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11. Deuterium differs from hydrogen ?

- A. Chemical properties
- B. Physical propertis
- C. Both physical and chemical properties

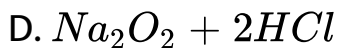
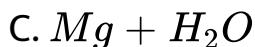
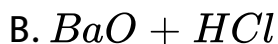
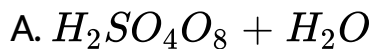
D. Radioactive properties

Answer: b



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12. Which of the following reaction produces hydrogen ?



Answer: c



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13. The oxidation states exhibited by hydrogen in its various compounds are :

- A. -1 only
- B. Zero only
- C. $+1$, -1 and zero.
- D. $+1$ only.

Answer: c



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14. In Bosch's process, which gas is utilised for the production of hydrogen gas

A. Producer gas

B. Water gas

C. Coal gas

D. None of these

Answer: b



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

A. PH_3

B. NH_3

C. HCl

D. CaH_2

Answer: d



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16. Under what condition of temperature and pressure the formation of atomic hydrogen from molecular hydrogen will be favoured most ?

A. High temperature and high pressure

B. Low temperature and low pressure

C. High temperature and low pressure

D. Low temperature and high pressure

Answer: C



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17. Which of the following could act as a propellant for rockets ?

A. *Liq. H₂ + Liq. O₂*

B. *Liq. N₂ + Liq. O₂*

C. *Liq. H₂ + Liq. N₂*

D. *Liq. O₂ + Liq. Ar*

Answer: a



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18. Hydrogen is evolved the action of cold dilute HNO_3

on :

A. *Fe*

B. *Mg* or *Mn*

C. *Cu*

D. *Al*

Answer: B



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19. Hydrogen acts as an oxidising agent in the reaction with :

A. bromine

B. calcium

C. nitrogen

D. sulphur

Answer: B



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20. Hydrogen combines with other elements by

- A. Losing an electron
- B. Gaining an electron
- C. Sharing an electron
- D. Losing, gaining or sharing electron

Answer: D



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21. Hydrogen can be produced by heating

A. *Cu* with H_2SO_4

B. Sodium formate

C. Sodium oxalate

D. None of these

Answer: B



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22. Which of the following explanation is best for not placing hydrogen with alkali metals or halogen

A. The ionization energy of hydrogen is high for group of alkali metals or halogen

B. Hydrogen can form compounds

C. Hydrogen is a much lighter element than the alkali metals or halogens

D. Hydrogen atom does not contain any neutron

Answer: c



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23. Which of the halogen has maximum affinity for hydrogen ?

A. F_2

B. Cl_2

C. Br_2

D. I_2

Answer: a



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24. Ortho and para hydrogen have :

- A. identical chemical properties but different physical properties
- B. identical physical and chemical properties
- C. identical physical properties but different chemical properties
- D. different physical and chemical properties

Answer: a



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25. 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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26. Which position for hydrogen explain all its properties ?

- A. At the top of halogen
- B. At the top of alkali metals
- C. At the top of carbon family
- D. None of these

Answer: d



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27. The metal which displaces hydrogen from a boiling caustic soda solution is :

A. *Mg*

B. *Fe*

C. *As*

D. *Zn*

Answer: d



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28. Which of the following metals adsorbs hydrogen ?

A. *Zn*

B. *Pd*

C. *Al*

D. *K*

Answer: b



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29. Very pure hydrogen (99.9 %) can be made by which of the following processes ?

A. Mixing natural hydrocarbons of high molecular weight

B. Electrolysis of water

C. Reaction of salt like hydrides with water

D. Reaction of methane with steam

Answer: b



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30. Hydrogen readily combines with non – metals and thus it shows its

A. Electronegativity character

B. Electropositive character

C. Bothe (*a*) and (*b*)

D. None of these

Answer: b



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31. The radioactive isotopes of hydrogen is :

A. Tritium

B. Deuterium

C. para hydrogen

D. nascent hydrogen

Answer: a



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32. Metal hydride on treatment with water gives :

A. H_2O_2

B. H_2O

C. acid

D. hydrogen

Answer: d



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33. Which of the following pair of substances will not evolve H_2 gas

A. Fe and H_2SO_4 (aqueous)

B. Copper and HCl (aqueous)

C. Sodium and ethyl alcohol

D. Iron and steam

Answer: B



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34. 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 B on reaction with dilute sulphuric acid at room temperature. B on reaction with dilute sulphuric acid at room temperature. A imparts a golden yellow colour to a smokeless flame of bunsen flame. A , B , C and D are respectively.

A. Na , H_2 , $NaOH$, Zn

B. K , H_2 , KOH , Al

C. Ca , H_2 , $Ca(OH)_2$, Sn

D. CaC_2 , C_2H_2 , $Ca(OH)_2$, Fe

Answer: a



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35. Free hydrogen is found in

A. Water gas

B. Marsh gas

C. Water

D. Acids

Answer: A



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36. Hydrogen resembles in many of its properties :

A. halogen

B. Alkali metals

C. both (a) and (b)

D. none of these

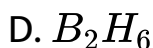
Answer: C



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37. Boron with hydrogen forms a number of hydrides which are known as boranes. These hydrides are classified into closo-boranes and nido-boranes. The simplest hydride of boron is diborane. Boron apart from having $(2c, 2e)$ bonds also contains $(3c, 2e)$ bonds.

Which of the following is an electron-deficient compound ?



Answer: D



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38. When the same amount of zinc is treated separately with excess of H_2SO_4 and excess of $NaOH$, the ratio of volumes of H_2 evolved is:

A. 1:1

B. 1:2

C. 2:1

D. 9:4

Answer: A



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39. Hydrogen from HCl can be prepared by

A. Mg

B. Cu

C. P

D. *Pt*

Answer: a



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40. Hydrogen accepts an electron to form inert gas configuration, it resembles

A. Halogen

B. Alkali metals

C. Chalcogens

D. Alkaline earth metals

Answer: a



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41. Action of water or dilute mineral acids on metal can give :

A. monohydrogen

B. tritium

C. dihydrogen

D. trihydrogen

Answer: c



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42. Which pair does not show hydrogen isotopes?

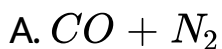
- A. Ortho hydrogen and para hydrogen
- B. Protium and deuterium
- C. Deuterium and tritium
- D. Tritium and protium

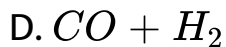
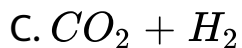
Answer: A



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43. Water gas is :



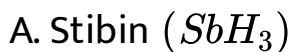


Answer: d



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44. Which of the following has the highest proton affinity?



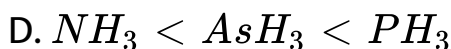
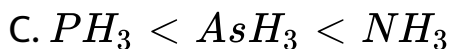
D. *Ammonia*(NH_3)

Answer: D



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45. Which of the following is the correct order of increasing enthalpy of vaporisation ?



Answer: C



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46. Ortho and para hydrogen differ in

- A. Proton spin
- B. Electron spin
- C. Nuclear charge
- D. Nuclear reaction

Answer: A



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47. Hydrogen gas is not liberated when the following metal is added to dil. HCl :

A. Mg

B. Sn

C. Ag

D. Zn

Answer: c



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48. Hydrogen acts as an oxidising agent in the reaction with :

A. Br_2

B. Ca

C. N_2

D. S

Answer: b



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49. Out of the following metals which will give H_2 on reaction with $NaOH$:

I: Zn, ,II: Mg,

III: Al, ,IV: Be

A. *I, II, III, IV*

B. *I, III, IV*

C. *II, IV*

D. *I, III*

Answer: B



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Water

1. Which is true statement about D_2O and H_2O ?

A. D_2O has lower dielectric constant than H_2O

B. $NaCl$ is more soluble in D_2O than in H_2O

C. Both are correct

D. None of these

Answer: A



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2. Action of water or dilute mineral acids on metal can give :

A. monohydrogen

B. Tritium

C. dihydrogen

D. Trihydrogen

Answer: c



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3. Which of the following pairs consists of molecular having the same mass number?

A. H_2O and D_2O

B. H_2O and HTO

C. D_2O and HTO

D. DTO and HDO

Answer: c



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4. 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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5. Triple point of water is

A. $273K$

B. $373K$

C. $203K$

D. $193K$

Answer: a



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6. Deuteroammonia (ND_3) can be prepared :

A. be heating a solution of NH_4Cl in $NaOD$

B. by action of heavy water on magnesium nitride

C. by fractionation of ordinary ammonia

D. None of these

Answer: B



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7. The temporary hardness of water due to calcium bicarbonate can be removed by adding

A. $CaCO_3$

B. $Ca(OH)_2$

C. $CaSO_4$

D. HCl

Answer: B



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8. Which of the following acid is formed when SiF_4 reacts with water ?

A. SiF_4

B. H_2SiF_4

C. H_2SO_4

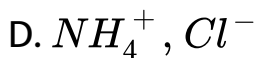
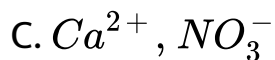
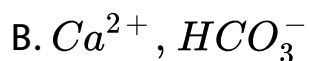
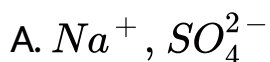
D. H_2SiF_6

Answer: B



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9. Which of the following pair of ions makes the water hard ?



Answer: b



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10. The bond angle and dipole moment of water respectively are :

A. 109.5° , $1.84D$

B. 107.5° , $1.56D$

C. 104.5° , $1.84D$

D. 102.5° , $1.56D$

Answer: C



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11. Water contracts on heating :

A. to $100^{\circ}C$

B. from $10^{\circ}C$ to $20^{\circ}C$

C. to $273K$

D. from $0^{\circ}C$ to $4^{\circ}C$

Answer: d



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12. Pure water can be obtained from sea water by

A. Centrifugation

B. Plasmolysis

C. Reverse osmosis

D. Sedimentation

Answer: C



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13. Which is false about ice?

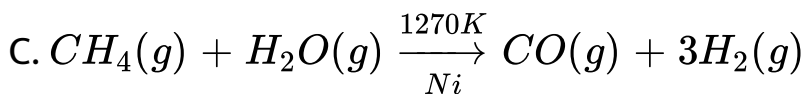
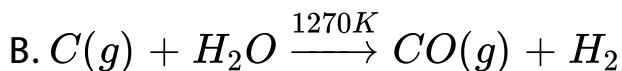
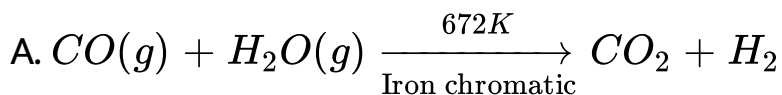
- A. It has open cage like structure.
- B. It has less density than water.
- C. Each O atom is surrounded by four H atoms.
- D. Each O atom has four H – bonds around it.

Answer: D



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14. Which one of the following reactions represents water – gas shift reaction ?



D. None of these

Answer: a



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15. A variety of water which contains soluble salts of Ca and Mg is known as :

- A. heavy water
- B. soft water
- C. hard water
- D. conductivity water

Answer: C



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16. Which will produce hard water ?

A. Saturation of water with $CaSO_4$

B. Addition of $NaSO_2$ to water

C. Saturation of water with $CaCO_3$

D. Saturation of water with $MgCO_3$

Answer: a



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17. The alum used for purifying water is

A. Ferric alum

B. Chrome alum

C. Potash alum

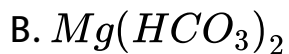
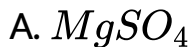
D. Ammonium alum

Answer: C



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18. Temporary hardness of water is due to the presence of



Answer: b



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19. Metal which does not react with cold water but evolves H_2 with steam is :

A. Fe

B. K

C. Pt

D. Na

Answer: A



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20. Which of the following is not true ?

A. Hardness of water depends on its behaviour towards soap

B. The temporary hardness is due to the presence of soluble *Ca* and *Mg* bicarbonates

C. Permanent hardness is due to the presence of soluble *Ca* and *Mg* sulphate , chlorides and nitrates

D. Permanent hardness can be removed by boiling the water

Answer: D



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21. Which of the following will cause softening of hard water ?

- A. Passing it through cation exchange resin
- B. Passing it through anion exchange resin
- C. Passing it through sand
- D. Passing it through alumina

Answer: a



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22. Polyphosphates are used for softening agents because they

- A. form soluble complexes anionic species
- B. precipitate anionic species
- C. form soluble complexes with cationic species
- D. precipitate cationic species

Answer: c



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23. Which one of the following removes temporary hardness of water ?

A. Slaked lime

B. Plaster of Paris

C. Cuprous

D. Hydrolith

Answer: A



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24. The reagent commonly used to determine hardness of water titrimetrically is :

A. oxalic acid

B. disodium salt of *EDTA*

C. sodium citrate

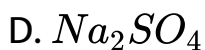
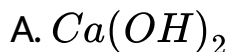
D. sodium thiosulphate

Answer: b



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25. The temporary hardness of water due to calcium bicarbonate can be removed by adding



Answer: A



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26. Lead pipes are not used for carrying drinking water because

- A. They are covered with a coating of lead carbonate
- B. They are corroded by air and moisture
- C. Water containing dissolved air attacks lead forming soluble hydroxide
- D. None of these

Answer: C

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27. Select the correct statement for heavy water.

A. It is less denser than common water

B. It is an oxide of deuterium

C. It has a heavy or bad taste

D. It has a heavier isotope of oxygen

Answer: b

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28. 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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29. Which of the following is not true ?

A. Ordinary water is electrolysed more rapidly than



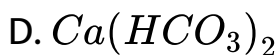
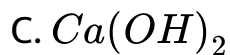
- B. Reaction between H_2 and Cl_2 is much faster than D_2 and Cl_2
- C. D_2O freezes at lower temperature than H_2O
- D. Bond dissociation energy for D_2 is greater than H_2

Answer: c



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30. Chemical (X) is used for water softening to remove temporary hardness. (X) reacts with sodium carbonate to generate caustic soda. When CO_2 is bubbled through (X)?



Answer: C



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31. Heavy water is used in nuclear reactors as

A. source of α particles.

B. slowing down the speed of high energy neutrons.

C. transporting heat of the reactor.

D. heating purposes.

Answer: B

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32. Which of the following is not a hard water ?

- A. Water containing $CaCl_2$
- B. Water containing dil. HCl
- C. Water containing $MgSO_4$
- D. None of these

Answer: d

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33. The molarity of pure water at $4^{\circ}C$ is

A. $1M$

B. $2.5M$

C. $5M$

D. $55.5M$

Answer: d



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34. Water is said to be permanently hard when it contains :

A. Chloride and sulphates of Mg and Ca

B. Bicarbonates of Na and K .

C. Carbonates of Na and K

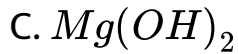
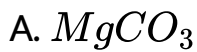
D. Phosphate of Na and K .

Answer: a



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35. When temporary hard water containing $Mg(HCO_3)_2$ is boiled, the ppt. formed is of



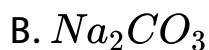
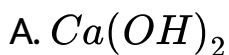
D. None of these

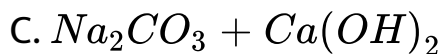
Answer: c



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36. Permanent hardness due to Mg^{2+} ions is best removed by





D. None of these

Answer: C

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37. Heavy water is compound of :

A. hydrogen and heavier isotope of oxygen.

B. heavier isotope of hydrogen and heavier isotope of oxygen.

C. oxygen and heavier isotope of hydrogen.

D. None of these

Answer: C

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38. Whichh of the following is correct about heavy water ?

- A. Water at $4^{\circ}C$ having maximum density is known as heavy water
- B. It is heaving than water (H_2O)
- C. It is formed by the combination of heavy isotope of hydrogen and oxygen
- D. None of these

Answer: B

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39. Which of the following statements do not define the characteristic property of water Water is a universal solvent ?

- A. It can dissolve maximum number of compounds
- B. It has very low dielectric constant
- C. It has high liquid range
- D. None of these

Answer: B





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40. Which of the followign is used as a moderator in nuclear reactors ?

- A. Ordinary water
- B. Heavy water
- C. hard water
- D. Hydrogen peroxide

Answer: B



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41. By adding which of the following process, permanent hardness of water can be removed.

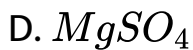
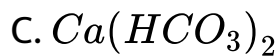
- A. Sodalime
- B. Sodium bicarbonate
- C. Washing soda
- D. Sodium chloride

Answer: c



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42. Hardness producing salt, whose solubility in water decreases with rise of temperature is



Answer: B



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43. Molecular weight of heavy water is

A. 19

B. 18

C. 17

D. 20

Answer: D



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44. The bond angle and dipole moment of water respectively are :

A. 109.5° , $1.84D$

B. 107.5° , $1.56D$

C. 104.5° , $1.84D$

D. 102.5° , $1.56D$

Answer: c



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45. Of the two solvent H_2O and D_2O , $NaCl$ dissolves

- A. Equally in both the solvents
- B. Only in H_2O but remains insoluble in D_2O
- C. More in D_2O
- D. More in H_2O

Answer: d



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46. When zeolite, which is hydrated sodium aluminium silicate is treated with hard water, the sodium ions (Na^{\oplus}) are exchanged with

A. OH^{-} ions

B. SO_4^{2-} ions

C. Ca^{2+} ions

D. H^{+} ions

Answer: C



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47. Which of the following metal will not reduce H_2O ?

A. *Ca*

B. *Fe*

C. *Cu*

D. *Li*

Answer: c



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

A. 90°

B. 180°

C. 102°

D. 105°

Answer: D



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49. Two ice cubes are pressed over each other and unite to form one cube . Which force is responsible of holding them together ?

A. Hydrogen bond formation

B. Van der Waals forces

C. Covalent attraction

D. Ionic interaction

Answer: a

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50. Water obtained by purification with organic ion exchange resins is

- A. Pure water
- B. Free from only Ca^{2+}, Mg^{2+} ions
- C. Free from HCO_3^- , SO_4^{2-} and Cl^- ions only
- D. None of these

Answer: d

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51. Which of the following can effectively remove all types of hardness of water?

A. Soap

B. Washing soda

C. Slaked lime

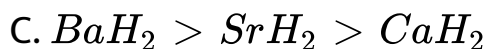
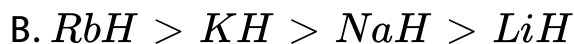
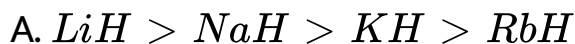
D. None of these

Answer: a



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52. The correct order of stability of hydrides of alkali metals is



D. None of these

Answer: a



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53. Point out the incorrect statement

- A. Hardness of water depends upon its soap consuming power
- B. Temporary hardness is due to bicarbonates of calcium and magnesium
- C. Permanent hardness is due to soluble sulphates, chlorides and nitrates of Ca and Mg
- D. Permanent hardness can be removed by boiling water

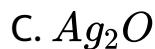
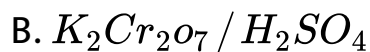
Answer: d



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Hydrogen Peroxide

1. Which substance cannot be reduced by H_2O_2



Answer: D



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2. Which of the following statements about H_2O_2 is not true ?

- A. H_2O_2 is used to clean oil paintings
- B. H_2O_2 acts as oxidising as well reducing agent
- C. Two hydroxyl groups in H_2O_2 lie in the same plane
- D. It retains same structure in liquid and solid form

Answer: c



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3. The volume of oxygen liberated from 0.68g of H_2O_2 is :

A. 112ml

B. 224ml

C. 56ml

D. 336ml

Answer: B



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4. The species that does not contain peroxide bond is

//are :

A. PbO_2

B. H_2O_2

C. SrO_2

D. BaO_2

Answer: a



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5. H_2O_2 acts as an oxidising agent in

A. Neutral medium

B. Acidic medium

C. Alkaline medium

D. Acidic and alkaline medium

Answer: D

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6. Hydrogen peroxide is a powerful oxidising agent, both in the acidic and alkaline medium.

In acidic medium: $H_2O_2 + 2H^{\oplus} + 2e^{\ominus} \rightarrow 2H_2O$

In alkaline medium: $H_2O_2 + 2e^{\ominus} \rightarrow 2OH^{\ominus}$

Hydrogen peroxide acts as a reducing agent towards powerful oxidising agents.

In acidic medium: $H_2O_2 \rightarrow 2H^{\oplus} + O_2 + 2e^{\ominus}$ In

alkaline medium, however, its reducing nature is more effective.

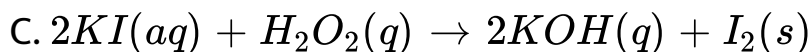
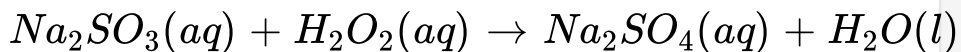
$H_2O_2 \rightarrow 2H^{\oplus} + O_2 + 2e^{\ominus}$

In which of the following reactions, H_2O_2 act as a reducing agent?

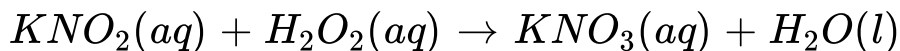
A.



B.



D.

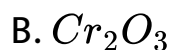


Answer: a



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7. When hydrogen peroxide is added to acidified potassium dichromate, a blue colour is produced due to formation of :



Answer: c



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8. On shaking H_2O_2 with acidified potassium dichromate and ether, ethereal layer becomes

A. Green

B. Red

C. Blue

D. Black

Answer: C



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9. HCl is added to following oxides. Which one would give H_2O_2 ?

A. MnO_2

B. PbO_2

C. BaO

D. None of these

Answer: D



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10. The oxide that gives H_2O_2 on treatment with a dilute acid is

A. PbO_2

B. Na_2O_2

C. MnO_2

D. TiO_2

Answer: B



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11. Nitrates of all metals are

A. Soluble in water

B. Insoluble

C. Coloured

D. Unstable

Answer: A



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12. H_2O_2 used in rockets has the concentration

A. 50 %

B. 70 %

C. 30 %

D. 90 %

Answer: D



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13. H_2O_2 is

- A. Poor polar solvent than water
- B. Better polar solvent than H_2O
- C. Both have equal polarity
- D. Better polar solvent but its strong auto oxidising ability limits its use as such

Answer: d



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14. The dihedral angle in gaseous H_2O_2 is

A. 180°

B. 90°

C. 111.5°

D. $109^\circ - 28$

Answer: c



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15. $O - O - H$ bond angle in H_2O_2 is approximately_____.

A. 107.28°

B. 109.28°

C. 104.5°

D. 97°

Answer: d



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16. Which substance does not speed up to decomposition of H_2O_2 ?

A. Glycerol

B. *Pt*

C. Gold

D. MnO_2

Answer: a



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17. The amount of H_2O_{20} present in $1L$ of $1.5NH_2O_2$ solution is

A. $2.5g$

B. $25.5g$

C. $3.0g$

D. $8.0g$

Answer: a



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18. The decomposition of H_2O_2 can be checked by addition of

A. alkali metal oxides

B. benzene

C. acetanilide

D. MnO_2

Answer: C



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19. Equivalent weight of H_2O_2 is

A. 17

B. 34

C. 68

D. 18

Answer: A



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20. A dilute solution of H_2O_2 is labelled as 20 volume .

Its percentage strength is :

A. 10 %

B. 6.070 %

C. 30 %

D. 3 %

Answer: b



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

A. 250ml

B. 300ml

C. 150ml

D. 200ml

Answer: B



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22. H_2O_2 is used as :

- A. antiseptic
- B. bleaching agent
- C. propellant
- D. all

Answer: d



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23. The reaction of $H_2S + H_2O_2 \rightarrow S + 2H_2O$ manifests

- A. Acidic nature of H_2O_2
- B. Alkaline nature of H_2O_2
- C. Oxidising nature of H_2O_2
- D. Reducing action of H_2O_2

Answer: c

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24. Hydrogen peroxide is now generally prepared on industrial scale by the

- A. action of H_2SO_4 on barium peroxide
- B. action of H_2SO_4 on sodium peroxide
- C. electrolysis of 50 % H_2SO_4
- D. burning hydrogen in excess of oxygen

Answer: C



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25. The oxide that gives H_2O_2 on treatment with a dilute acid is

- A. MnO_2
- B. PbO_2

C. Na_2O_2

D. TiO_2

Answer: c



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26. H_2O_2 is always stored in black bottles because

A. It is highly unstable

B. Its enthalpy of decomposition is high

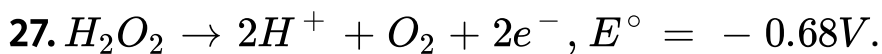
C. It undergoes autoxidation on prolonged standing

D. None of these

Answer: C



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This equation represents which of the following behaviour of H_2O_2

A. Reducing

B. Oxidising

C. Acidic

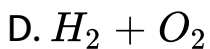
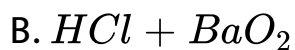
D. Catalytic

Answer: a



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28. In lab H_2O_2 is prepared by



Answer: a



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29. The structure of H_2O_2 is

A. planar

B. non — planar

C. spherical

D. linear

Answer: B



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30. There is a sample of 10 volume of hydrogen peroxide solution . Calculate its strength.

A. 3.00 %

B. 4.045 %

C. 2.509 %

D. 3.035 %

Answer: D



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31. Blackened oil painting can be restored into original form by the action of

A. Cl_2

B. H_2O_2

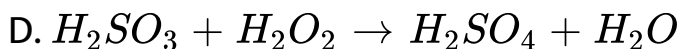
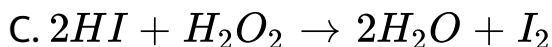
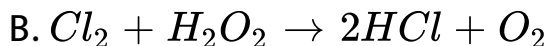
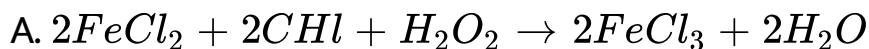
C. MnO_2

D. PbO_2

Answer: b

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



Answer: B

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33. Commercial 11.2 volume H_2O_2 solution has a molarity of

- A. 1.0
- B. 0.5
- C. 11.2
- D. 1.12

Answer: A



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34. Which of the following undergoes reduction with H_2O_2 in an alkaline medium ?

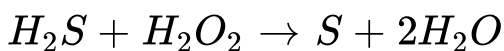


Answer: b



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35. In the reaction.



A. H_2S is an and H_2O_2 is a base

B. H_2S is a base and H_2O_2 is an acid

C. H_2S is an oxidizing agent and H_2O_2 is a reducing agent

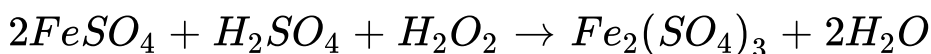
D. H_2S is a reducing agent and H_2O_2 is an oxidising agent

Answer: D

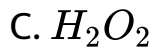
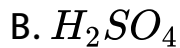
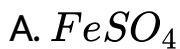


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36. In the reaction,



The oxidising agent is



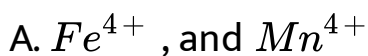
D. both (b) and (c)

Answer: C



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37. in alkaline medium, H_2O_2 reacts with Fe^{3+} and Mn^{o+} respectively to give :



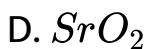
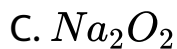


Answer: c



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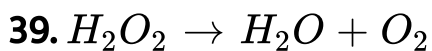
38. H_2O_2 can be obtained when following reacts with H_2SO_4 excepts with



Answer: a



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This represents

- A. Oxidation of H_2O_2
- B. Reduction of H_2O_2
- C. Disproportionation of H_2O_2
- D. Acidic nature of H_2O_2

Answer: C



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40. Decomposition of H_2O_2 is accelerated by

- A. Traces of acids
- B. Acetanilide
- C. Finely divided metals
- D. Alcohol

Answer: C



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41. H_2O_{20} is manufactured these days

A. By the action of H_2O_2 on BaO_2

B. By the action of H_2SO_4 on Na_2O_2

C. By electrolysis of 50 % H_2SO_4

D. By burning hydrogen in excess of oxygen

Answer: c



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Section B Assertion Reasoning

1. Assertion : H_2 molecule is more stable than $He - H$ molecule .

Reason : The antibonding electron in $He - H$ molecule decreases the bond order thereby the stability.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: a



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2. Assertion : H_2 exists in two isomeric forms known as ortho and para forms

Reason : The ortho and para H_2 differ in the spin of their electron.

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3. Assertion : H_2O_2 is non – ionic compound.

Reason : The $O - O$ bond length in H_2O_2 is shorter than that of O_2F_2 .

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4. Assertion : H_2O_2 has higher boiling point than water

Reason : It has stronger dipole interactions than that shown by water.

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5. Assertion : The decomposition of H_2O_2 is a disproportionation reaction.

Reason : $2H_2O_2 \rightarrow 2H_2O + O_2$.

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6. Assertion : H_2O_2 is used as a bleaching agent for delicate materials like silk, wool etc.

Reason : The bleaching action of H_2O_2 is due to reduction.

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7. Assertion : Heavy water is widely used as a moderator in nuclear reactors.

Reason : It slows down the fast moving neutrons and thus helps in controlling the nuclear reactions.

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8. Assertion : H_2O_2 decomposes carbonates and bicarbonates to evolve CO_2 gas.

Reason : H_2CO_3 is stronger acid than H_2O_2 .



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9. Assertion : Demineralised water does not contain any ions.

Reason : Permutit process for water softening gives demineralised water.



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10. Assertion : Reaction between protium and chloride is much faster than between deuterium and chlorine.

Reason : Enthalpy of dissociation of D_2 is less than H_2 .





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11. Assertion : H_2 gas is liberated at anode because.

Reason : Sodium hydride contains H^- ion.



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12. Assertion : Ionic hydrides like hydrolith liberates hydrogen gas on reaction with water.

Reason : The resultant solution acts as strong base.



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13. Assertion : The water gas shift reaction can be used to increase the amount of H_2 in the shift ' syn gas ' mixture.

Reason : In this reaction, water is reduced to H_2 by CO .

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14. Assertion NH_3 is an electron precise hydride.

Reason : NH_3 has one lone pair of electrons on N atom.

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15. Assertion : Calgon is used in manufacture of soft water being used for laundry purpose.

Reason : Ca^{2+} and Mg^{2+} ions present in hard water are rendered ineffective by calgon forming their soluble complexes.

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16. Assertion : D_2O has higher boiling point than H_2O .

Reason : Viscosity of $H_2O(l)$ is less than that of $D_2O(l)$

.

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1. At its melting point ice is lighter than water because

A. H_2O molecules are more closely packed in solid state

B. Ice crystals have hollow hexagonal arrangement of H_2O molecules

C. On melting of ice the H_2O molecule shrinks in size

D. Ice forms mostly heavy water on first melting

Answer: B



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

A. K and KO_2

B. Ca and CaH_2

C. Na and Na_2O_2

D. Ba and BaO_2

Answer: b



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3. The dielectric constant of H_2O_2 is 80. The electrostatic force of attraction between Na^+ and Cl^- will be

A. reduced to $1/80$ in water than in air

B. reduced to $1/40$ in water than in air

C. will be increased to 80 in water than in air

D. will remain unchanged.

Answer: A



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4. $O - O - H$ bond angle in H_2O_2 is approximately_____.

A. 106°

B. $109^\circ 28'$

C. 120°

D. 97°

Answer: D



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5. Which of the following groups of ions makes the water hard ?

A. Sodium and bicarbonate

B. Magnesium and chloride

C. Potassium and sulphate

D. Ammonium and chloride

Answer: B



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6. The volume strength of $1.5NH_2O_2$ solution is

A. $4.8L$

B. $5.2L$

C. $8.4L$

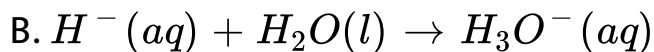
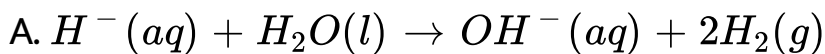
D. $8.8L$

Answer: c

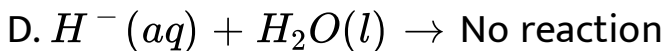
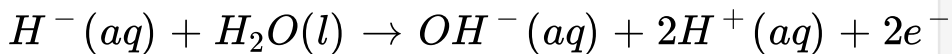


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7. The hydride ion H^{\ominus} is a stronger base than hydroxide ion. Which of the following reaction would occur if NaH is dissolved in water



C.



Answer: A



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8. Which of the following pair of substances will not evolve H_2 gas

A. Iron and H_2SO_4 (aqueous)

B. Iron and steam

C. Sodium and ethyl alcohol

D. Copper and HCl (aqueous)

Answer: d



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9. 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 B on reaction with dilute sulphuric acid at room temperature. B on reaction with dilute sulphuric acid at room temperature. A imparts a golden yellow colour to a smokeless flame of bunsen flame. A , B , C and D are respectively.

A. K , H_2 , KOH , Al

B. Na , H_2 , $NaOH$, Zn

C. Ca , H_2 , $Ca(OH)_2$, Sn

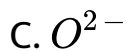
D. CaC_2 , C_2H_2 , $Ca(OH)_2$, Fe

Answer: b



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10. When H_2O_2 is oxidised, the product is



Answer: b



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11. Pure water can be obtained from sea water by

A. Centrifugation

B. Plasmolysis

C. Sedimentation

D. Reverse osmosis

Answer: D



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12. Which statement about zeolite is false ?

A. They are used as cation exchanger

B. They have open structure which enables them to
take up small molecules

C. Zeolites are aluminosilicates having three dimensional networks

D. Some of the SiO_4^{4-} units are replaced by AlO_4^{5-} and AlO_6^{9-} ions in zeolites

Answer: d



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13. 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 statements are correct ?

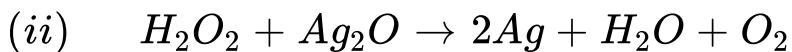
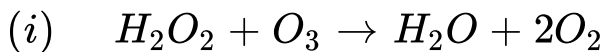
- A. (i) and (ii)
- B. (i), (ii) and (iii)
- C. (ii) and (iii)
- D. (i) and (iii)

Answer: a



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14. Role of hydrogen peroxide in the following reaction is respectively.



A. oxidizing in (i) and reducing in (ii)

B. reducing in (i) and oxidizing in (ii)

C. reducing in (i) and (ii)

D. oxidizing in (i) and (ii)

Answer: d



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

- A. Dihydrogen 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

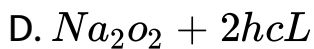
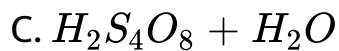
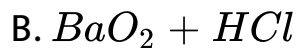
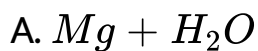
Answer: a,b



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Aims Questions

1. Which of the following reaction produces hydrogen ?



Answer: a



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2. Ortho and para hydrogen differ in

A. proton spin

B. Electron spin

C. Nuclear charge

D. Nuclear reaction

Answer: A



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3. 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

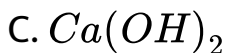
D. low temperature and low pressure

Answer: a



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4. Chemical (X) is used for water softening to remove temporary hardness. (X) reacts with sodium carbonate to generate caustic soda. When CO_2 is bubbled through (X)?



Answer: c



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5. Which of the following is correct for hydrogen?

- A. It can form bonds in $+1$ as well as -1 oxidation state
- B. It is always collected at cathode
- C. It has a very high ionization potential
- D. It has same electronegativity as halogens

Answer: A



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6. By adding which of the following process, permanent hardness of water can be removed.

- A. soda lime
- B. Sodium bicarbonate
- C. Washing soda
- D. Sodium chloride

Answer: c



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

- A. 90°
- B. 180°
- C. 102°

D. 105°

Answer: D



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8. Two ice cubes are pressed over each other and unite to form one cube . Which force is responsible of holding them together ?

A. Hydrogen bond formation

B. Van der Waals forces

C. Covalent attraction

D. Ionic interaction

Answer: A



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9. Triple point of water is

A. $273K$

B. $373K$

C. $203K$

D. $193K$

Answer: a



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Assertion Reasoning Questions

1. Assertion : Nascent hydrogen is more reactive than molecular hydrogen.

Reason : Nascent hydrogen is associated with more energy

- A. if both the assertion and reason are true and reason is true explanation of the assertion.
- B. If both the assertion and reason are true but the reason is not the correct explanation of assertion.
- C. If the assertion is true but reason is false.
- D. If assertion if false but reason is true.

Answer: a

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2. Assertion (A): Alkali metals can form ionic hydrides which contain hydride ion, H^- .

Reason (R): The alkali metals have low EN. Their hydrides conduct electricity, when fused and liberate hydrogen at the anode.

A. if both the assertion and reason are true and reason is true explanation of the assertion.

B. If both the assertion and reason are true but the reason is not the correct explanation of assertion.

C. If the assertion is true but reason is false.

D. If assertion if false but reason is true.

Answer: a



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3. Assertion : Among H_2^- , He , He^+ , He^{2+} , H_2^- has the largest their parent atoms.

A. if both the assertion and reason are true and reason is true explanation of the assertion.

B. If both the assertion and reason are true but the reason is not the correct explanation of assertion.

C. If the assertion is true but reason is false.

D. If assertion if false but reason is true.

Answer: a



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Section D Chapter End Test

1. Polyphosphates are used for softening agents because they

A. form soluble complexes anionic species

B. precipitate anionic species

C. form soluble complexes with cationic species

D. precipitate cationic species

Answer: c



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2. 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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3. One mole of calcium phosphide on reaction with excess water gives

- A. One mole of phosphene
- B. Two moles of phosphene
- C. Two moles of phosphene
- D. One mole of phosphene pentoxide

Answer: C

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4. When zeolite, which is hydrated sodium aluminosilicate, is treated with hard water, the sodium ions are exchanged with:

A. H^+ ions

B. Ca^{2+} ions

C. Mg^{2+} ions

D. Both Ca^{2+} and Mg^{2+}

Answer: D



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5. Pick the odd one out

A. Sodium borohydride reacts very slowly with cold water

B. Sodium borohydride reacts very violently with cold water to produce H_2

C. Solubility of sodium borohydride in water at $25^\circ C$ is $10.5g/mL$

D. Melting point of sodium borohydride is $500^\circ C$

Answer: b



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6. Hydrogen gas will not reduce:

- A. Heated cupric oxide
- B. Heated ferric oxide
- C. Heated stannic oxide
- D. Heated aluminium oxide.

Answer: D



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7. HCl is added to following oxides. Which one would give H_2O_2 ?

A. MnO_2

B. PbO_2

C. BaO

D. None of these

Answer: d



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8. Which of the following pairs will not produce dihydrogen gas ?

A. $Cu + HCl(dil)$

B. $Fe + H_2SO_4$

C. $Mg + steam$

D. Na + alcohol

Answer: A



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9. The amount of H_2O_2 present in 1L of 1.5N H_2O_2 solution is

A. 2.5g

B. 25.5g

C. 3.0g

D. 8.0g

Answer: b



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10. Hydrogen is evolved the action of cold dilute HNO_3

on :

A. Fe

B. Mn

C. Cu

D. Al

Answer: b



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11. Hydrogen can behave as a metal

- A. At very high temperature
- B. At very low temperature
- C. At very high pressure
- D. At very low pressure

Answer: C



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12. D_2O is preferred to H_2O , as a moderator, in nuclear reactors because

A. D_2O slow down fast neutrons better

B. D_2O has high specific heat

C. D_2O is cheaper

D. None of these

Answer: d



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13. Out of the two allotropic forms of dihydrogen, the form with lesser molecular energy is

A. Ortho

B. Meta

C. Para

D. All have same energy

Answer: c



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14. Saline hydrides react explosively with water, such fires can be extinguished by

A. Water

B. Carbon dioxide

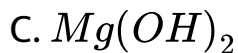
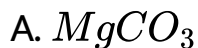
C. Sand

D. None of these

Answer: c

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15. When temporary hard water containing $Mg(HCO_3)_2$ is boiled, the ppt. formed is of

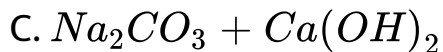
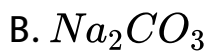
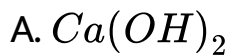


D. None of these

Answer: C

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16. Permanent hardness due to Mg^{2+} ions is best removed by



D. None of these

Answer: C



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17. Plumbosolvency is a health hazard in the transport of

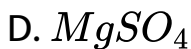
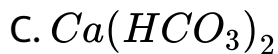
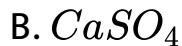
- A. Hard water only
- B. Soft water only
- C. both (a) and (b)
- D. Water containing plum juice

Answer: B



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18. Hardness producing salt, whose solubility in water decreases with rise of temperature is



Answer: B



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19. A sample of water containing some dissolved table sugar and common salt is passed through organic ion exchange resins. The resulting water will be

A. Tasteless

B. Sweet

C. Salty

D. None of these

Answer: B



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20. Water obtained by purification with organic ion exchange resins is

A. Pure water

B. Free from only Ca^{2+} , Mg^{2+} ions

C. Free from HCO_3^- , SO_4^{2-} and Cl^- ions only

D. None of these

Answer: d



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21. 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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22. There is a sample of 10 volume of hydrogen peroxide solution. Calculate its strength.

A. 1 %

B. 3 %

C. 10 %

D. 90 %

Answer: b



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23. Lead pipes are not used for carrying drinking water because

- A. They are covered with a coating of lead carbonate
- B. They are corroded by air and moisture
- C. Water containing dissolved air attacks lead forming soluble hydroxide
- D. None of these

Answer: c



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24. Hardness of water is due to presence of salts of

A. Na^+ and K^+

B. Ca^{2+} and Mg^{2+}

C. Ca^{2+} and K^+

D. Ca^{2+} and Na^+

Answer: b



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25. There is a sample of 10 volume of hydrogen peroxide solution. Calculate its strength.

A. 3.00 %

B. 4.045 %

C. 2.509 %

D. 3.035 %

Answer: d



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26. A dilute solution of H_2O_2 is labelled as 20 volume .

Its percentage strength is :

A. 30 %

B. 6 %

C. 3 %

D. 10 %

Answer: b



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27. The volume of oxygen liberated from 0.68g of H_2O_2 is

A. 112ml

B. 224ml

C. 56ml

D. 336ml

Answer: b



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28. Assertion : Calgon is used in manufacture of soft water being used for laundry purpose.

Reason : Ca^{2+} and Mg^{2+} ions present in hard water are rendered ineffective by calgon forming their soluble complexes.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: d

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29. Assertion : The decomposition of H_2O_2 is a disproportionation reaction.

Reason : $2H_2O_2 \rightarrow 2H_2O + O_2$.

- A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
- B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
- C. If assertion is true but reason is false.
- D. If assertion is false but reason is true.

Answer: a

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30. Assertion : Hydrogen peroxide forms only one series of salts called peroxides.

Reason : Hydrogen peroxide molecule has two replaceable hydrogen atom.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: d



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