CHEMISTRY

BOOKS - MTG CHEMISTRY (HINGLISH)

HYDROGEN

Position Of Hydrogen Atom In The Periodic Table

1. In what respect electronic configuration of hydrogen and halogens are similar ?

A. Hydrogen and halogens have one electron in their outermost shell .

B. Hydrogen and halogens have one electron less then the noble gas configuration.

C. Hydrogen and halogens can lose one electron to form positive ions.

D. Hydrogen and halogens show noble gas configuration.

Answer: B

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2. Which of the following properties of hydrogen is incorrect?

A. Like halogens, hydrogen exists as a diatomic gas.

B. Like halogens, hydrogen exhibits -1 oxidation state in its compounds with metals.

C. Like halogens, hydrogen is liberated at cathode.

D. The ionisation energy of hydrogen is quite close to halogens.

Answer: C

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3. In which of the following properties hydrogen does not show similarity with alkali metals?

A. Electropositive character

B. Reducing nature

C. Electronic configuration $\left(ns^1\right)$

D. Diatomic nature of molecule

Answer: D

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Dihydrogen

1. A deuterium is

A. an electron with a positive charge

B. a nucleus having two protons

C. a nucleus containing a neutron and two protons

D. a nucleus containing a neutron and a proton.

Answer: D

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2. Which one of the following is not an isotope of hydrogen ?

A. Protium

B. Ortho- para hydrogen

C. Deuterium

D. Tritium

Answer: B

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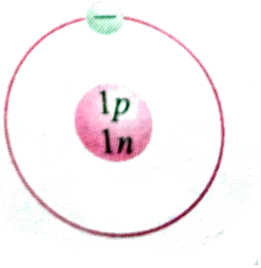
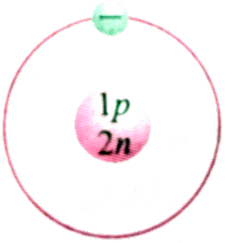
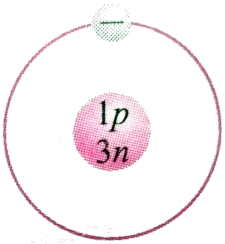
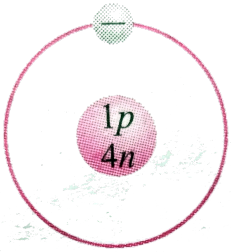
3. Which of the following is an atom of tritium?

A. 

B. 

C. 

D. 

Answer: B

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4. The isotopes of hydrogen have different physical properties due to difference in mass. They have almost same chemical properties with a difference in their rates of reactions which is mainly due to

A. their different enthalpy of bond dissociation

B. different electronic configurations

C. different atomic masses

D. different physical properties.

Answer: A

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Preparation Of Dihydrogen

1. Which of the following metals will react with NaOH and KOH to liberate hydrogen gas?

A. Zn, Al, Fe and Mg

B. Al, Fe, Mg and Sn

C. Zn, Sn and Al

D. Fe, Mg and Al

Answer: C

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2. Which of the following metals does not liberate hydrogen from acids?

A. Fe

B. Cu

C. Mg

D. Zn

Answer: B

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

A. Na

B. Mg

C. Au

D. Fe

Answer: D

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4. Nascent hydrogen is prepared by

A. Na and C_2H_5OH

B. Al and $NaOH$

C. Zn and dil. H_2SO_4

D. All of these

Answer: D

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5. Which of the following is laboratory preparation of dihydrogen?

A. $3Fe + 4H_2O(steam) \rightarrow Fe_3O_4 + 4H_2$

B. $2Na + 2H_2O \rightarrow Ca(OH)_2 + 2H_2$

C. $CaH_2 + 2H_2O \rightarrow Ca(OH)_2 + 2H_2$

D. $Zn + H_2SO_4(dil.) \rightarrow ZnSO_4 + H_2$

Answer: D

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6. The process of production of syngas from sewage, saw - dust, scrap wood, etc. is quite common these days. The production of syngas from coal is called

A. carbonisation

B. water gas shift

C. coal gasification

D. synthesis gas shift.

Answer: C

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7. Syngas is a mixture of

A. $CO_2 + H_2$

B. $CO + H_2$

C. $CO + CO_2$

D. $CO + O_2$

Answer: B

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8. The production of dihydrogen obtained from coal gasification can be increased by reacting carbon monoxide of syngas mixture with steam in presence of a catalyst iron chromate. What is this process called?

A. Hydrogen reaction

B. Water - gas shift reaction

C. Coal - gas shift reaction

D. Syn gasification

Answer: B

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9. Water gas is mixed with steam and the mixture is passed over heated Fe_2O_3 in presence of Cr_2O_3. The mixture when passed in water dissolves CO_2 and dihydrogen left undissolved is collected . This method of preparation of hydrogen gas is know as

A. Bosch process

B. Lane process

C. Kellner process

D. Hall process

Answer: A

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Properties Of Dihydrogen

1. Which of the following is not a property of hydrogen ?

A. It is a colourless, odourless gas

B. It is highly combustible.

C. It is highly poisonous gas

D. It is lighter than air.

Answer: C

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2. If a mole of hydrogen molecule is heated to a high temperature then which of the following reactions take place ?

A. $H_{2(g)} + 436\text{kj mol}^{-1} \rightarrow H_{(g)} + H_{(g)}$

B. $2H_{2(g)} + 820\text{kj mol}^{-1} \rightarrow 2H_{2(g)}$

C. $H_{2(g)} + H_{2(g)} + 436\text{kj mol}^{-1} \rightarrow H^+\_(aq) + H_{aq}^-$

D. $H_{2(g)} + 200\text{kj mol}^{-1} \rightarrow H_{(g)} + H_{(g)}$

Answer: A

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3. Which of the following statements is not correct regarding hydrogen:

A. Hydrogen show + 1 and -1 oxidation states.

B. Hydrogen is never liberated at anode.

C. Hydrogen has same ionisation enthalpy as that of alkali metals.

D. Hydrogen has same electronegativity as that of halogens.

Answer: A

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4. The order of reactivity of halogens towards hydrogen is

A. $F_2 < Cl_2 < Br_2 < I_2$

B. $I_2 < Br_2 < Cl_2 < F_2$

C. $Cl_2 < Br_2 < I_2 < F_2$

D. $Br_2 < Cl_2 < F_2 < I_2$

Answer: A

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5. Hydrogen burns in air with a

A. light bluish flame

B. yellow flame

C. cimson red flame

D. green flame.

Answer: A

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6. Which of the following reactions of hydrogen with non - metals represents Haber's process ?

A. $2H_2 + O_2 \xrightarrow{\text{heat}} 2H_2O, \Delta H = -285.9\text{kj mol}^{-1}$

B. $3H_2 + N_2 \xrightarrow[200atm]{673K, Fe} 2NH_3, \Delta H = -92.6\text{kJ mol}^{-1}$

C. $H_2 + Cl_2 \xrightarrow{hv} 2HCI$

D. $2H_2 + C \xrightarrow{1100^\circ C} CH_4$

Answer: B

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7. Which of the following metals directly combine with hydrogen gas to give a hydride ?

A. Au

B. Ni

C. Ca

D. Cu

Answer: C

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8. Which property of hydrogen is shown by the following reaction ?

(i) $Fe_3O_4 + 4H_2 \rightarrow 3Fe + 4H_2O$

(ii) $CO + H_2 \xrightarrow[Cr_2O_3]{\text{ZnO}} CH_3OH$

A. reducing character

B. Oxidising character

C. Combustibility

D. High reactivity

Answer: A

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9. A metal (M) produces a gas (N) on reaction with alkalies like NaOH and KOH. Same gas is produced when the metal reacts with dilute sulphuric acid. Gas (N) reacts with another toxic gas (P) to form methanol at high temperature and pressure . (N) also reacts with metals like (Q) to form electrovalent hydrides. M, N, P and Q respectively are

A. Zn, H_2, CO, Na

B. Na, H_2, CI_2, Ca

C. AI, H_2, H_2S, B

D. Mg, H_2, NO_2, AI

Answer: A

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10. Alkenes combine with carbon monoxide and hydrogen in presence of octacarbonyldicobalt as catalyst under high temperature and pressure to form

A. aldehydes which can be further reduced to alcohols by hydrogen

B. alkanes which are formed by addition of hydrogen

C. alcohols formed byb reaction CO and hydrogen

D. Ketones which can be further reduced to aldehydes by hydrogen.

Answer: A

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Hydrides

1. What is the trend of boiling points of hydrides of N, O and F ?

A. Due to lower molecular masses NH_3, H_2O and HF have lower boiling points than those of the subsequent group member hydrides.

B. Due to higher electronegativity of N, O and F, NH_3, H_2O and HF show hydrogen bonding and hence higher boiling points than the hydrides of their subsequent group members.

C. There is no regular trend in the boiling points of hydrides.

D. Due to higher oxidation states of N, O and F, the boiling points of NH_3, H_2O and HF are higher than the hydrides of their subsequent group members.

Answer: B

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2. On moving from left to right in a period what is the order of acidic character of hydrides ?

A. $NH_3 < H_2O < HF$

B. $HF < H_2O < NH_3$

C. $H_2O < HF < NH_3$

D. $H_2O < NH_3 < HF$

Answer: A

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3. In complex hydrides, hydride ions act as ligand and are coordinated to metal ions. These hydrides are good reducing agents. Which of the following hydrides is not a complex hydride ?

A. $LiAlH_4$

B. $NaBH_4$

C. $(AlH_3)_n$

D. $LiBH_4$

Answer: C

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4. Which of the following hydrides is electron deficient ?

A. NaH

B. CaH_2

C. CH_4

D. B_2H_6

Answer: D

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5. Which of the following statements regarding graphite is not correct ?

A. Ionic hydrides are crystalline, non - volatile and non-conducting in solid state.

B. Electron - deficient hydrides act as Lewis acids or electron acceptors.

C. Elements of group - 13 form electron - deficient hydrides.

D. Elements of group 15 - 17 form electron - precise hydrides.

Answer: D

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6. Dihydrogen form three types of hydrides. (i)___ hydrides are formed by alkali metals and alkaline earth metals. (ii)___ hydrides are formed by non-metals and (iii)___ hydrides are formed by d abd f-block elements at elevated temperature. Complex metal hydrides such as (iv)___ and (v)___ are powerful reducing agents.

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7. Do you expect the carbon hydrides fo the type (C_nH_{2n+2}) to act as 'Lewis' acid or base? Justify your answer.

A. carbon hydrides are electron - rich hydrides

B. carbon hydrides are electron - deficient hydrides

C. carbon hydrides are electron - precise hydrides

D. carbon hydrides are non - stoichiometric hydrides.

Answer: C

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8. In group 6, only one metal forms hydride. This metal is

A. Mo

B. W

C. Cr

D. Sg

Answer: C

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9. Phosphorus cannot form PH_5 with its outer electronic configuration as $3s^3 3p^3$ because

A. phosphorus cannot show +5 oxidation state

B. PH_5 is not a stable compound

C. $\Delta_a H$ value of dihydrogen and $\Delta_{eg} H$ value of hydrogen do not favour higher oxidation state of phosphorus

D. phosphorus is not very reactive hence does not form PH_5

Answer: C

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10. Among NH_3, H_2O, and HF, which would you expect to have highest magnitude of hydrogen bonding and why?

A. HF due to maximum polarity.

B. H_2O due to lone pairs of electrons.

C. NH_3 due to small size of nitrogen.

D. H_2S due to higher electron affinity of sulphur.

Answer: A

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11. Non-stoichiometric hydrides are formed by

A. palladium, vanadium

B. manganese, lithium

C. nitrogen, fluorine

D. carbon, nickel

Answer: A

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12. Given below are the elements and the type of hydrides formed by them. Mark the incorrect match.

A. phosphorus - Molecular hydride

B. potassium - Ionic hydride

C. Vanadium - Interstital hydride

D. Nitrogen - Electron - deficient covalent hydride

Answer: D

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Water

1. Liquid water is denser than ice due to

A. higher surface tension

B. hydrogen bonding

C. van der Waals forces

D. covalent bonding.

Answer: B

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2. The density of water is less in its solid state because

A. in solid state (ice), water molecules are arranged in highly ordered open cage like structure

B. more extensive hydrogen bonding is present in solid state ice

C. the water molecules are closest in solid state of water

D. water is a rigid crystalline, closely packed structure in its solid state.

Answer: A

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3. Water plays a key role in the biosphere. It is due to certain properties of H_2O as compared to other liquids. These are except

A. higher specific heat

B. lesser thermal conductivity

C. high dielectric constant

D. high surface tension.

Answer: B

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

A. 90°

B. 180°

C. 102°

D. 105°

Answer: D

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5. Which is not a property of water ?

A. It is a colourless and tasteless liquid.

B. There is no hydrogen bonding in solid state of water.

C. It is an excellent solvent for transportation of ions in plants and animals.

D. Ice is lighter than liquid water.

Answer: B

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6. Which of the statements given below are true for the structure of water molecule ?

(i) Oxygen undergoes sp^3 hybridisation.

(ii) Due to presence of two lone pairs of electrons on oxygen the H - O - H bond angle is 118.4°.

(iii) Due to angular geometry the net dipole moment of water is not zero, $\mu = 1.84D$.

A. (i) and (ii)

B. (ii) and (iii)

C. (i) and (iii)

D. only (ii)

Answer: C

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7. The maximum number of hydrogen bonds formed by a water molecule in ice is

A. 4

B. 1

C. 2

D. 3

Answer: A

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8. In which of the following reactions H_2O_2 acts as a reducing agent ?

A. $H_2O_{(l)} + NH_{3(aq)} \Leftrightarrow OH^-_{(aq)} + NH^+_{4(aq)}$

B. $H_2O_{(l)} + H_2S_{(aq)} \Leftrightarrow H_3O^+_{(aq)} + HS^-_{(aq)}$

C. $H_2O_{(l)} + H_2O_{(l)} \Leftrightarrow H_3O^+_{(aq)} + OH^-_{(aq)}$

D. $H^+_{(aq)} + OH^-_{(aq)} \Leftrightarrow H_2O_{(l)}$

Answer: A

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9. What is the reaction given below, called ?

$$H_2O_{(l)} + H_2O_{(l)} \Leftrightarrow H_3O^+_{(aq)} + OH^-_{(aq)}$$

A. Hydrolysis of water

B. Hydration of water

C. Disproportionation of water

D. Auto - protolysis of water

Answer: D

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10. Given below are two reactions of water with sodium and carbon dioxide. What is the nature of water is these reactions?

(i) $2Na_2H_2O \rightarrow 2NaOH + H_2$

(ii) $6CO_2 + 12H_2O \rightarrow C_6H_{12}O_6 + 6H_2O + 6O_2$

A. In (ii) water acts as an oxidising agent and in (i) it acts as a reducing agent.

B. In (i) water acts as an oxidising agent while in (ii) it acts as a reducing agent.

C. In both, (i) and (ii) hydrogen acts as a reducing agent.

D. In both, (i) and (ii) hydrogen acts as an oxidising agent.

Answer: B

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11. Which of the following reactions shows reduction of water ?

A. $2H_2O + 2Na \rightarrow 2NaOH + H_2$

B. $6CO_2 + 12H_2O \rightarrow C_6H_{12}O_6 + 6H_2O + 6O_2$

C. $2F_2 + 2H_2O \rightarrow 4H^+ + 4F^- + O_2$

D. $P_4O_{10} + 6H_2O \rightarrow 4H_3PO_4$

Answer: A

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12. Hydrolysis of $SiCl_4$ gives

A. $Si(OH)_4$

B. $SiOCI_2$

C. SiO_2

D. H_2SiO_4

Answer: C

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13. Fluorine decomposes cold water to give

A. $4H^+ + 4F^-$ and O_2

B. HF and H_2

C. HF only

D. H_2F_2 and HFO_4

Answer: A

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14. Which gas is produced when calcium nitride (Ca_3N_2) is hydrolysed by water ?

A. N_2

B. NH_3

C. H_2

D. O_2

Answer: B

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15. Study the following reactions and mark the correct properties shown by water.

(i) $SO_3 + H_2O \rightarrow H_2SO_4$

(ii) $CI_2O_7 + H_2O \rightarrow 2HCIO_4$

(iii) $CaO + H_2O \rightarrow Ca(OH)_2$

(iv) $Na_2O + H_2O \rightarrow 2NaOH$

A. All oxides react with water to give hydroxides.

B. Acidic oxides are formed by metals and basic oxides by non-metals.

C. Non - metal oxides combine with water to form acids while metallic oxides combine with water to form alkalies.

D. Acidic oxides are stronger than basic oxides since they form strong acids.

Answer: C

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

A. Five

B. One

C. Four

D. Three

Answer: B

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17. During hydrate formation from aqueous solution, water can be associated in different forms. Indicate the wrong combination.

(i) Coordinated water $-\left[Cr(H_2O)_6\right]^{3+}3CI^-$

(ii) Interstitial water $-BaCI_2.2H_2O$

(iii) Hydrogen bonded water $-\left[Cu(H_2O)_4\right]^{2+}SO_4^{2-}.H_2O$

A. (i)

B. (ii)

C. (iii)

D. None of these.

Answer: D

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

A. $CaCO_3$

B. $CaCI_2$

C. HCI

D. $Ca(OH)_2$

Answer: D

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19. The process used for the removal of hardness of water is

A. Baeyer

B. Calgon

C. Hoope

D. Serpeck

Answer: B

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20. A water sample is said to contain permanent hardness if water contains

A. sulphates and chlorides of calcium and magnesium

B. carbonates of calcium and magnesium

C. bicarbonates of calcium and magnesium

D. sulphates and chlorides of sodium and potassium.

Answer: A

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21. In a permutit, the calcium and magnesium ions of hard water are exchanged by

A. CO^{2-} and HCO_3^- ions of permutit

B. Na^+ ions of permutit

C. AI^{3+} ions of permutit

D. Si^{4+} ions of permutit.

Answer: B

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22. Which of the following represents calgo?

A. $Na_2AI_2Si_2O_8$

B. $Mg_3(PO_4)_2$

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

D. $Na_2\left[Mg_2(PO_3)_6\right]$

Answer: C

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23. The formula for permutit or zeolite which is used as softner in ion - exchange method is

A. $NaAlSiO_4$

B. $NaAlO_2$

C. $Ca_3(PO_4)_2$

D. Na_2SO_4

Answer: A

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24. Presence of water can be detected by

A. adding a drop to anhydrous copper sulphate which changes its colour from white to blue

B. by boiling and testing for the presence of H_2 and O_2

C. by seeing its colour and transparency

D. by checking the production of lather when mixed with soap.

Answer: A

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25. Which of the following is not a disadvantage of using hard water?

A. In production of steam in boilers

B. Formation of scales in cooking utensils

C. In ion exchangers

D.

Answer: D

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26. Polyphosphates llike sodium hexametaphosphate (calgon) are used as water softening agents because they

A. form soluble complexes with anionic species

B. precipitate anionic species

C. form soluble complexes with cationic species

D. precipitate cationic species.

Answer: C

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27. What is meant by 'demineralised water' and how it can be obtained?

A. Water free from cations and anions.

B. Water free from minerals dissolved in it.

C. Water free from impurities.

D. Water free from Na^+ and K^+ ions.

Answer: A

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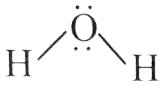
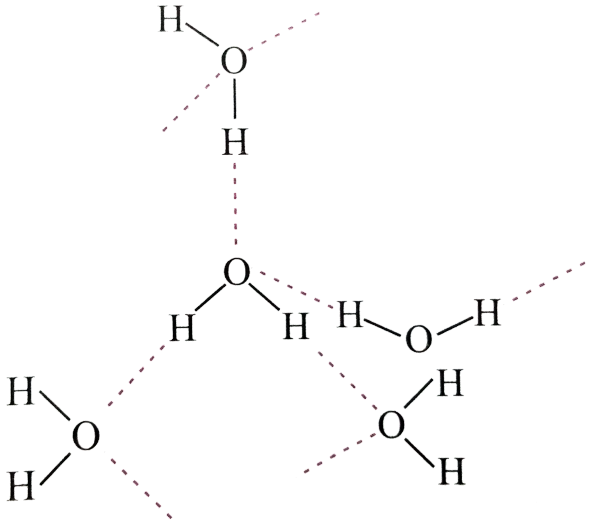
Mcqs

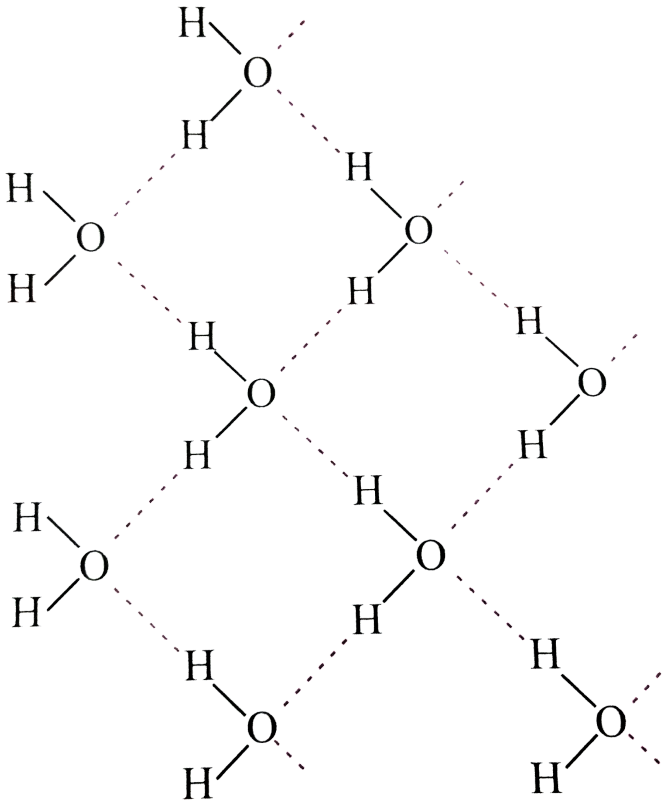
1. Choose the correct statement about the given figures.

(I)



(II)





A. (II) represents solid state while (III) represents liquid state.

B. (II) represents liquid state while (III) represents solid state.

C. (I) represents solid state while (III) represents liquid state.

D. (I) represents liquid state While (III) represents solid state.

Answer: B

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Hydrogen Peroxide

1. Which of the following represents the chemical equation involved in the preparation of H_2O_2 from barium peroxide ?

A. $BaO_2.8H_2O + H_2SO_4 \rightarrow BaSO_4 + H_2O_2 + 8H_2O$

B. $CH_3CHOHCH_3 + O_2 \rightarrow CH_3COCH_3 + H_2O_2$

C. $BaO_2 + CO_2 + 3H_2O \rightarrow BaCO_3 + H_2O_2$

D. $Ba_3(PO_4)_2 + 3H_2SO_4 \rightarrow 3BaSO_4 + 2H_3PO_4$

Answer: A

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2. Which of the following is not a process of preparation of hydrogen peroxide ?

A. Auto - oxidation of 2 - ethylanthraquinol.

B. By passing oxygen through boiling water.

C. By oxidation of isopropyl alcohol.

D. By reaction of barium peroxide with dil. H_2SO_4.

Answer: B

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3. Which of the following reagents cannot be used for the preparation of hydrogen peroxide ?

A. Sodium peroxide

B. 2 - Ethylanthraquinol

C. Sodium thiosulphate

D. Barium peroxide

Answer: C

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4. Peroxodisulphate, on hydrolysis yields

A. water

B. dihydrogen

C. hydrogen peroxide

D. deuterium.

Answer: C

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5. A commercial sample of hydrogen peroxide is labelled as 10 volume. Its percentage strength is nearly

A. $3\ \%$

B. $1\ \%$

C. $90\ \%$

D. $10\ \%$

Answer: D

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6. Strength of 10 volume hydrogen peroxide solution means

A. $30.35gL^{-1}$

B. $17gL^{-1}$

C. $34gL^{-1}$

D. $68gL^{-1}$

Answer: A

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7. What will be the strength of 20 vol of H_2O_2 in terms of gram per litre?

A. $60.71gL^{-1}$

B. $5.6gL^{-1}$

C. $30.62gL^{-1}$

D. $17gL^{-1}$

Answer: A

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8. What will be the mass of oxygen liberated by decomposition of 200 mL hydrogen peroxide solution with a strength of 34 g per litre ?

A. $25.5g$

B. $3.0g$

C. $3.2g$

D. $4.2g$

Answer: C

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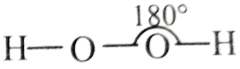
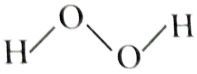
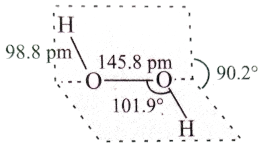
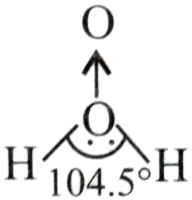
9. Which of the following is a true structure of H_2O_2 in solid phase?

A. 

B. 

C. 

D. 

Answer: C

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10. Mark the following statements as true or false.

(i) Ordinary hydrogen is a mixture of 75% ortho and 25% para - forms.

(ii) All the four atoms of molecule of H_2O_2 lie in the same plane.

(iii) Hydrogen peroxide is neutral like water.

(iv) H_2O_2 can be prepared from BaO_2 but not from MnO_2 and PbO_2

A. (i) and (iv) - true, (ii) and (iii) - false

B. (i) and (ii) - true, (iii) and (iv) - false

C. (iii) and (iv) - true, (i) and (ii) - false

D. (i) and (iii) - true, (ii) and (iv) - false

Answer: A

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11. Which of the following statements regarding hydrogen peroxide is / are incorrect ?

A. It is a strong oxidising agent.

B. It is decomposed by MnO_2.

C. It behaves as a reducing agent.

D. It is more stable in basic solution.

Answer: D

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12. H_2O_2 acts as a bleaching agent because of

A. reducing nature of H_2O_2

B. oxidising nature of H_2O_2

C. acidic nature of H_2O_2

D. basic nature of H_2O_2.

Answer: B

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13. Given below are the two reactions of H_2O_2. Mark the correct statement which follows.

(i)

$2KMnO_4 + 3H_2SO_4 + 5H_2O_2 \rightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 5O_2$

(ii) $2Cr(OH)_3 + 4NaOH + 3H_2O_2 \rightarrow 2Na_2CrO_4 + 8H_2O$

A. (i) Show oxidising nature of H_2O_2 and (ii) shows reducing nature of H_2O_2.

B. In (i) H_2O_2 acts as a reducing agent and in (ii) it acts as an oxidising agent.

C. In both (i) and (ii), H_2O_2 acts as an oxidising agent.

D. In both (i) and (ii), H_2O_2 acts as a reducing agent.

Answer: B

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14. What happens when an alkaline solution of potassium ferricyanide is reacted with H_2O_2?

A. Potassium ferricyanide is oxidised to potassium ferrocyanide becomes colourless and H_2O_2 is oxidised.

B. Potassium ferricyanide becomes colourless and H_2O_2 is oxidised to O_2.

C. Potassium ferricyanide is reduced to ferric hydroxide and H_2O_2 is oxidised to H_2O.

D. Potassium ferricyanide is reduced to potassium ferrocyanide and H_2O_2 is oxidised to O_2.

Answer: D

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15. When CO_2 is bubbled throgh a solution of barium peroxide in water

A. carbonic acid is formed

B. H_2O_2 is formed

C. H_2O is formed

D. barium hydroxide is formed.

Answer: B

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16. Which of the following equation depicts reducing nature of H_2O_2 ?

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

B. $Ag_2O + H_2O_2 \rightarrow 2Ag + H_2O + O_2$

C. $2HCHO + H_2O_2 \rightarrow 2HCOOH + H_2O$

D. $Na_2SO_3 + H_2O_2 \rightarrow Na_2SO_4 + H_2O$

Answer: B

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17. Which of the following act as a stabiliser for the storage of H_2O_2?

A. Alkali

B. Dust

C. Urea

D. None of these.

Answer: C

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18. Statuse and paintings coated with white lead turn black on long exposure to atmosphere. The original colour can be restored by

treating them with H_2O_2. The reason behind this is

A. blackened statues get coated with PbS which on reaction with H_2O_2 is oxidised to white $PbSO_4$

B. H_2O_2 dissolves the coating white lead and exposes the inner surface.

C. White lead reacts with H_2O_2 to form white $PbSO_4$

D. blackened statuse get coated with lead sulphate which reacts with H_2O_2 to give PbS.

Answer: A

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19. Which of the following easily catalyse the decomposition of H_2O_2 when stored ?

(i) Rough surface

(ii) Sunlight

(iii) Dust particles

(iv) Metals

A. (i) and (ii)

B. (i),(ii) and (iii)

C. (ii) and (iv)

D. All of these.

Answer: D

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20. Last traces of water is removed is removed from H_2O_2 by

A. electrolysis

B. crystallisation

C. condensation

D. evaporation.

Answer: B

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21. Which of the following cannot be used as a test for H_2O_2?

A. A paper dipped in Pbs (black) true white when brought in contact with H_2O_2.

B. It liberates iodine from KI solution which gives blue color with starch solution.

C. It gives blue color with $K_4\left[Fe(CN)_6\right]$.

D. It decolourises acidified $KMnO_4$ solution.

Answer: C

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Heavy Water

1. What is heavy water ?

A. H_2O^{18}

B. D_2O

C. H_2O^{17}

D. H_2O

Answer: B

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2. Heavy water is obtained by

A. boiling water

B. heating H_2O_2

C. prolonged electrolysis of H_2O

D. all of these.

Answer: C

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3. Which of the following reactions is not used in preparation of deuterium compounds using heavy water?

A. $CaC_2 + 2D_2O \rightarrow C_2D_2 + Ca(OD)_2$

B. $SO_3 + D_2O \rightarrow D_2SO_4$

C. $2AIN + 3D_2O \rightarrow AI_2O_3 + 2ND$

D. $AI_4C_3 + 12D_2O \rightarrow 3CD_4 + 4AI(OD)_3$

Answer: C

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4. The boiling point of heavy water is

A. 100°

B. $101.4^\circ C$

C. $99^\circ C$

D. $110^\circ C$

Answer: B

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5. Heavy water (D_2O) freezes at

A. $-3.8^\circ C$

B. $3.8^\circ C$

C. $0^\circ C$

D. $38^\circ C$

Answer: B

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6. Which compound is formed when calcium carbide reacts with heavy water?

A. C_2D_2

B. CaD_2

C. CD_2

D. Ca_2D_2

Answer: A

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7. Heavy water is used aas

A. drinking water

B. detergent

C. washing water

D. a moderator

Answer: D

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8. Some of the major used of heavy water are given below. Which one is not correct?

A. It is used as a moderator in nuclear reactors.

B. It is used as a tracer compound for studying reaction mechanism.

C. High concentration of heavy water accelerates the growth of plants.

D. It is used in preparing deuterium.

Answer: C

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Higher Order Thinking Skills

1. The varous types of hydrides and examples of each type are given below :

	Hydride type		Compound
(A)	Electron deficient	(i)	LiH
(B)	Saline	(ii)	CH_4
(C)	Electron-precise	(iii)	NH_3
(D)	Interstitial	(iv)	B_2H_6
(E)	Electron rich	(v)	CrH

Choose the correct matching from the codes given below :

A. (A) - (ii), (B) - (iv), (C)-(v), (D)-(iii), (E)-(i)

B. (A) - (iv), (B)-(i), (C)-(ii), (D)-(v), (E)-(iii)

C. (A) -(iv), (B) - (iii), (C)-(v), (D)-(ii), (E)-(i)

D. (A)-(v), (B)-(iii), (C)-(iv), (D)-(ii), (E)-(i)

Answer: B

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2. Match list I with list II. Choose the correct matching codes from the choices given.

	List I (Hydride)		List II (Type of hydride)
A.	BeH_2	1.	complex
B.	AsH_3	2.	Lewis acid
C.	B_2H_6	3.	Interstitial
D.	LaH_3	4.	Covalent
E.	$LiAlH_4$	5.	Intermediate

A. A-6, B-2, C-4, D-5, E-1

B. A-6, B-2, C-4, D-3, E-1

C. A-6, B-4, C-2, D-3, E-5

D. A-5, B-4, C-2, D-3, E-1

Answer: D

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3. Select the incorrect statement from the following :

A. H^+ can exist as $H_9O_4^+$ in water.

B. H_2 is thermally stable.

C. Ionisation of CH_3COOH is slower than that of CH_3COOD.

D. Kinetic isotopic effect is observed when there is retardation in the rate if H_2O is replaced by D_2O.

Answer: C

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4. Compound X on reduction with $LiAlH_4$ gives a hydride Y containing 21.72% hydrogen and other products. The compound Y reacts with air expolosively resulting in boron trioxide. What are X and Y respectively ?

A. BCl_3, B_2H_6

B. PCl_3, B_2H_6

C. B_2H_6, BCl_3

D. $LiAlH_4$, PCl_3

Answer: A

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5. Choose the correct option as directed.

A. $CsH > KH > NaH > LiH$ (Order of stability)

B. $H_2O < NH_3 < CH_4$ (Order of dipole moment)

C. $PH_3 < AsH_3 < NH_3 < SbH_3$ (Order of boiling point)

D. $X - - - H - X, X = O > F > N > S > Cl$ (Order of strength of H-bonding)

Answer: C

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6. The molecular formula of a commercial resin used for exchanging ions in water softening is $C_8H_7SO_3Na(mol.\ Wt.\ 206)$. What would be the maximum uptake of Ca^{2+} ions by the resin when expressed in mole per gram resin?

A. $\frac{2}{309}$

B. $\frac{1}{412}$

C. $\frac{1}{103}$

D. $\frac{1}{206}$

Answer: B

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7. $5.0cm^3$ of H_2O_2 liberates 0.508 g of iodine from an acidified KI solution. The strength of H_2O_2 solution in terms of volume strenth at STP is

A. 6.48 volumes

B. 4.48 volumes

C. 7.68 volumes

D. none of these

Answer: B

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8. 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. with O_2

B. with MnO_2

C. with OH^-

D. one with O_2 and one with MnO_2

Answer: A

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9. Which of the following is not true ?

A. Ordinary water is electrolysed more rapidly than D_2O.

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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Ncert Exemplar

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

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

B. Its tendency to gain a single electron in its valence shell to attain stable electronic configuration.

C. Its low negative electron gain enthalpy value.

D. Its small size.

Answer: B

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

A. Ionisation enthalpy of hydrogen resembles that of alkali metals.

B. Its reactivity is similar to halogens.

C. It resembles both alkali metals and halogens.

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

Answer: D

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3. Metal hydrides are ionic, covalent or molecular in nature. Among LiH, NaH, KH, RbH, CsH the correct order of increasing ionic character is

A. $LiH > NAH > CsH > KH > RbH$

B. $LiH < NaH < KH < RbH < CsH$

C. $RbH > CsH > NaH > KH > LiH$

D. $NaH > CsH > RbH > LiH > KH$

Answer: B

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4. Which of the following hydrides is electron-precise hydride ?

A. B_2H_6

B. NH_3

C. H_2O

D. CH_4

Answer: D

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5. Radioactive elements emit α, β and γ rays and are characterised by their half-lives. The radioactive isotope of hydrogen is

A. protium

B. deuterium

C. tritium

D. hydronium

Answer: C

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6. Cosider the reactions

(i) $H_2O_2 + 2HI \rightarrow I_2 + 2H_2O$

(ii) $HOCl + H_2O_2 \rightarrow H_3O^+ + Cl^- + O_2$

Which of the following statements is correct about H_2O_2 with reference to these reactions ? Hydrogen peroxide is â€¦â€¦â€¦

A. an oxidising agent in both (A) and (B)

B. an oxidising agent in (A) and reducing agent in (B)

C. a reducing agent in (A) and oxidising agent in (B)

D. a reducing agent in both (A) and (B)

Answer: B

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7. The oxide that give H_2O_2 on treatment with dilute H_2SO_4 is

A. PbO_2

B. $BaO_2.8H_2O$

C. MnO_2

D. TiO_2

Answer: B

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8. Which of the following equations depict theoxidising nature of H_2O_2 ?

A. $2MnO_4^- + 6H^+ + 5H_2O_2 \rightarrow 2Mn^{2+} + 8H_2O + 5O_2$

B. $2Fe^{3+} + 2H^+ + H_2O_2 \rightarrow 2Fe^{2+} + 2H_2O + O_2$

C. $2I^- + 2H^+ + H_2O_2 \rightarrow I_2 + 2H_2O$

D. $KIO_4 + H_2O_2 \rightarrow KIO_3 + H_2O + O_2$

Answer: C

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9. Which of the following equation depicts reducing nature of H_2O_2?

A. $2\left[Fe(CN)_6\right]^{4-} + 2H^+ + H_2O_2 \rightarrow 2\left[Fe(CN)_6\right]^{3-} + 2H_2O$

B. $I_2 + H_2O_2 + 2OH^- \rightarrow 2I^- + 2H_2O + O_2$

C. $Mn^{2+} + H_2O_2 \rightarrow Mn^{4+} + 2OH^-$

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

Answer: B

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10. Hydrogen peroxide is

A. an oxidising agent

B. a reducing agent

C. both an oxidising and a reducing agent

D. neither oxidising nor reducing agent

Answer: C

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11. Which of the following reaction increases, production of dihydrogen from synthesis gas ?

A. $CH_{4(g)} + H_2O_{(g)} \xrightarrow[Ni]{1270K} CO_{(g)} + 3H_{2(g)}$

B. $C_{(s)} + H_2O_{(g)} \xrightarrow{1270K} CO_{(g)} + H_{2(g)}$

C. $CO_{(g)} + H_2O_{(g)} \xrightarrow[\text{Catalyst}]{673K} CO_{2(g)} + H_{2(g)}$

D. $C_2H_{6(g)} + 2H_{2(g)}O \xrightarrow[Ni]{1270K} 2CO_{(g)} + 5H_{2(g)}$

Answer: C

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12. When sodium peroxide is trated with the dilute sulphuric acid, we getâ€¦â€¦..

A. sodium sulphate and water

B. sodium sulphate and oxygen

C. sodium sulphate, hydrogen and oxygen

D. sodium sulphate and hydrogen peroxide

Answer: D

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13. Hydrogen peroxide is obtained by the electrolysis of _____.

A. water

B. sulphuric acid

C. hydrochloric acid

D. fused sodium peroxide

Answer: B

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14. Which of the following reactiona is an example of use of water gas in the synthesis of other compounds?

A. $CH_{4(g)} + H_2O_{(g)} \xrightarrow[Ni]{1270K} CO_{(g)} + H_{2(g)}$

B. $CO_{(g)} + H_2O_{(g)} \xrightarrow[\text{Catalyst}]{673K} CO_{2(g)} + H_{2(g)}$

C. $C_nH_{2n+2} + nH_2O_{(g)} \xrightarrow[Ni]{1270K} nCO + (2n+1)H_2$

D. $CO_{(g)} + 2H_{2(g)} \xrightarrow[\text{Catalyst}]{\text{Cobalt}} CH_3OH_{(l)}$

Answer: D

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15. Which of the following ions will cause hardness in water sample?

A. Ca^{2+}

B. Na^{+}

C. Cl^{-}

D. K^{+}

Answer: A

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16. Which of the following compounds is used for water softening ?

A. $Ca_3(PO_4)_2$

B. Na_2PO_4

C. $Na_6P_6O_{18}$

D. Na_2HPO_4

Answer: C

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17. Elements of which of the following group(s) of periodic table do not form hydrides?

A. Groups 7,8,9

B. Group 13

C. Groups 15, 16, 17

D. Group 14

Answer: A

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18. Only one element of _____ forms hydrode.

A. group 6

B. group 7

C. group 8

D. group 9

Answer: A

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Assertion And Reason

1. Assertion : In atomic form hydrogen consists of one proton and one electron.

Reason : In elemental form hydrogen exists as a diatomic molecule and is called dihydrogen.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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2. Assertion : Hydrogen resembles both, alkali metals as well as halogens.

Reason : Hydrogen forms oxides, halides and sulphides, and exists as diatomic molecule.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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3. Assertion : All the three isotope of hydrogen have almost the same chemical properties.

Reason : Isotopes differ from one another in respect of the presence of neutrons.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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4. Assertion : Dihydrogen is inert at room temperature.

Reason : The H - H bond dissociation enthalpy is the highest for a single bond between two atoms of any element.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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5. Assertion : Hydrides of group 13 elements are Lewis acids whereas hydrides of group 15-17 elements are Lewis bases.

Reason : Group 13 hydrides have few electrons whereas group 15-17 hydrides have excess electrons which are present as lone pairs.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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6. Assertion : Hydrides of N, O and F have lower boiling points than the hydrides of their subsequent group members.

Reason : Boiling point depends upon the molecular mass only.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D

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7. Assertion : When sodium hydride in fused state is electrolysed, hydrogen is dicharged at anode.

Reason : Sodium hydride is an electrovalent compound in which hydrogen is present as cation.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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8. Assertion : Ice cube floats on water.

Reason : Density of ice is less than that of water.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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9. Assertion : $CuSO_4.5H_2O$ has one hydrogen-bonded molecule of water.

Reason : The four molecules of water are coordinated in $CuSO_4.5H_2O$.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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10. Assertion : Soft water lathers with soap but not hard water.

Reason : Hard water reacts with soap to form insoluble salts which form scum, not lather.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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11. Assertion : Permanent hardness of water can be removed by using washing soda.

Reason : Washing soda reacts with soluble calcium and magnesium chlorides and sulphates in hard water to form insoluble carbonates.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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12. Assertion : In gaseous phase, H_2O and H_2O_2 both have bent structures.

Reason Bond angle of both H_2O and H_2O_2 is 04.5°.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D

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13. Assertion : A 30% solution of H_2O_2 is marketed as '100 volume' hydrogen perocide.

Reason : 1 L of 30 % H_2O_2 will give 100 mL of oxygen at STP.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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14. Assertion : H_2O_2 is stored in wax-lined glass or plastic vessels.

Reason : H_2O_2 decomposes slowly on exposure to light.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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15. Assertion : Melting and boiling points of D_2O are higher than those of ordinary H_2O.

Reason : D_2O has lesser degree of association and lower molecular mass than H_2O.

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

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

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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