CHEMISTRY

BOOKS - TARGET CHEMISTRY (HINGLISH)

HYDROGEN

Classical Thinking

1. Hydrogen combines with other elements by

A. losing electrons

B. gaining electrons

C. sharing electrons

D. losing , gaining or sharing of electrons

Answer: D

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2. Electronic configuration of hydrogen is smilar to that of _____.

A. transition elements

B. inert gases

C. alkaline earth metals

D. alkali metals

Answer: D

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3. What are different isotopes of hydrogen?

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4. In the combined form, dihydrogen constitues about _____ % of the earth's crust.

A. 7.2

B. 15.4

C. 30.8

D. 45.8

Answer: B

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5. Number of isotopes of hydrogen are

A. 2

B. 3

C. 4

D. 5

Answer: B

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6. Tritium undergose radioactive decay giving

A. α-particles

B. β-particles

C. neutrons

D. γ-rays

Answer: B

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7. The nucleus of a tritium $\left(._1^3 H\right)$ atom would contain _____ neutron(s) .

A. 1

B. 2

C. 3

D. 4

Answer: B

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8. The concentration of tritium is about one atom per _____ atoms of protium.

A. 10^4

B. 10^{18}

C. 10^{12}

D. 10^{16}

Answer: B

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9. Deuterium is used _____

A. as tracer in the study of mechanism of reactions

B. for increasing the rate of chemical reactions

C. as an oxidising agent in extraction of metals

D. in synthesis of rubber

Answer: A

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10. Metal, which gives H_2 on treatment with acid as well as alkali, is _____.

A. Ag

B. Cu

C. Zn

D. Hg

Answer: C

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11. Very pure hydrogen gas is prepared by the action of pure dilute H_2SO_4 on _____.

A. water

B. sodium hydride

C. magnesium ribbon

D. aluminium

Answer: C

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12. Which of the following reactions is known as Uyeno's method for preparation of hydrogen?

A. $Zn + 2NaOH \rightarrow Na_2ZnO_2 + H_2 \uparrow$

B. $Mg + H_2SO_{4(dil.)} \rightarrow MgSO_4 + H_2 \uparrow$

C. $NaH + H_2O \rightarrow NaOH + H_2 \uparrow$

D. $2Al + 2KOH + 2H_2O \rightarrow 2KAIO_2 + 3H_2 \uparrow$

Answer: D

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13. Hydrogen can be prepared by mixing steam and water gas at 500° C in the presence of Fe_2O_3 and Cr_2O_3. This process is called

A. Nelson process

B. Serpeck's process

C. Bosch process

D. Lane's process

Answer: C

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14. In Lane's process, hydrogen is formed by _____.

A. reaction of steam on hydrocarbons

B. mixing water gas with twice the volume of steam

C. electrolysis of brine solution

D. passing superheated steam over iron fillings

Answer: D

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15. Find the INCORRECT property about dihydrogen gas.

A. Odourless

B. Colourless

C. Tasteless

D. Non-combustible

Answer: D

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16. The bond dissociation enthalpy of dihydrogen at 298 K is _____.

A. $435.88kJmol^{-1}$

B. $-435.88kJmol^{-1}$

C. $43.588kJmol^{-1}$

D. $217.44kJmol^{-1}$

Answer: A

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17. Atomic hydrogen is produced by _____.

A. action of dilute H_2SO_4 on Zn.

B. action of water on CaH_2

C. passing molecular hydrogen through electric arc at high temperature

D. electrolysis of acidified water

Answer: C

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18. Which of the following halogens has great affinity for hydrogen?

A. F

B. Cl

C. Br

D. I

Answer: A

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19. The reaction of dinitrogen with dihydrogen gives ammonia and this manufacturing process is called _____.

A. Bosch process

B. Haber process

C. Lane's process

D. Dow's process

Answer: B

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20. Vanaspati's ghee is obtained by the reaction of dihydrogen with vegetable oil in the presence of _____ as a catalyst.

A. Al

B. Fe

C. O_2

D. Ni

Answer: D

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21. Dihydrogen is widely used for manufacturing of _____.

A. dioxygen

B. metal hydrides

C. dinitrogen

D. metal oxides

Answer: B

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22. Liquid hydrogen mixed liquid oxygen is used as _____.

A. vanaspati ghee

B. water gas

C. rocket fuel

D. fertilizer

Answer: C

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23. The temperature of _____ k is generated when atomic hydrogen is allowed to recombine on the surface to be welded.

A. 3000

B. 3400

C. 4000

D. 5000

Answer: C

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24. Ionic hydrides are formed by the elements of _____.

A. s-block

B. p-block

C. d-block

D. f-block

Answer: A

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25. Ionic hydrides are usually

A. good electrical conductors in molten state

B. volatile compounds

C. amorphous solids

D. liquids at room temperature

Answer: A

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26. What is molecular hydride?Explain with an examples.

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27. What is Covalent hydride ? Explain with an example.

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28. Which of the following hydrides is an electron-rich hydride?

A. HF

B. CH_4

C. B_2H_6

D. KH

Answer: A

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29. $TiH_{1.8-2}$ is an example of _____.

A. ionic hydride

B. covalent hydride

C. metallic hydride

D. polynuclear hydride

Answer: C

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30. Which of the following hydrides does NOT follow the law of constant proportion?

A. Saline hydrides

B. Electron - precise hydrides

C. Electron-rich hydrides

D. Metallic hydrides

Answer: D

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31. Which is the major source of water supply to the world?

A. saline lakes

B. polar ice and glaciers

C. rivers

D. oceans

Answer: D

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32. At very low temperature, ice condenses to _____ form.

A. triangular

B. pentagonal

C. hexagonal

D. cubic

Answer: D

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33. X-ray study of ice shows that each oxygen atom is surrounded tetrahedrally by four other hydrogen atom at a distance of _____.

A. 256 pm

B. 276 pm

C. 286 pm

D. 296 pm

Answer: B

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34. The boiling point of heavy water is

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

B. $99.^{\circ} C$

C. $101.4.^{\circ} C$

D. $110.^{\circ} C$

Answer: C

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35. The molecular formula of super heavy water is _____.

A. H_2O

B. D_2O

C. T_2O

D. HDO

Answer: C

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36. Super heavy water freeze at _____.

A. $0.^\circ C$

B. $273.^\circ C$

C. $4.48.^\circ C$

D. 9K

Answer: C

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37. Which of the following is the lightest isotopic variety of water?

A. $H_2.^{16}O$

B. $D_2.^{17}O$

C. $H_2.^{18}O$

D. $T_2.^{18}O$

Answer: A

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38. What happen when granulated zinc is reacted with NaOH ?

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39. Identify the product formed when barium peroxide is treated with phosphoric acid.

A. $Ba_3(PO_4)_2 + H_2O$

B. $Ba_3(PO_4)_2 + H_2$

C. $Ba(OH)_2 + P_2O_5 + H_2O_2$

D. $Ba_3(PO_4)_2 + H_2O_2$

Answer: D

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40. 10 volume H_2O_2 means _____.

A. One litre of H_2O_2 solution on decomposition gives 10 litre of O_2 at STP

B. 10 litre of H_2O_2 solution on decomposition gives 10 litre of O_2 at STP

C. One litre of H_2O_2 solution on decomposition gives 10 grams of O_2 at STP

D. One litre of H_2O_2 solution on decomposition gives 10 mL of O_2 at STP

Answer: A

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41. 30 volume H_2O_2 means _____.

A. 30% (w/v) H_2O_2 solution

B. $30cm^3$ of the solution contains 1g of H_2O_2

C. $1cm^3$ of the solution liberates $30cm^3$ of O_2 at S.T.P

D. $30cm^3$ of the solution contains one mole of H_2O_2

Answer: C

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42. A 10 volume H_2O_2 has a normality of _____.

A. 0.79 N

B. 1.79 N

C. 2.79 N

D. 3.79 N

Answer: B

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43. Commercially, hydrogen peroxide is marketed as 100 V, which means it contains _____.

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44. Bond angle between two plane in crystalline state of H_2O_2 is _____.

A. 90.2°

B. 94.8°

C. 111.5°

D. 101.9°

Answer: A

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45. What do you mean by syngas ?

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46. Hydrogen peroxide is sold in the market as _____.

A. petrol

B. hydrol

C. peroxide

D. perhydrol

Answer: D

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47. The oxidation number of oxygen in $H_2O_2$is

A. $+1$

B. -1

C. $+2$

D. -2

Answer: B

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48. Hydrogen peroxide does NOT act as a / an _____.

A. oxidising agent

B. reducing agent

C. bleaching agent

D. drying agent

Answer: D

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49. H_2O_2 on reacting with ethene gives

A. ethane

B. ethanal

C. ethylene glycol

D. ethanol

Answer: C

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50. _____ is present as an impurity in dihydrogen.

A. oxides of Nitrogen

B. Oxygen

C. Helium

D. Carbon monoxide

Answer: A::D

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51. By which process ,syngas is produced from coal ?

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52. what happens when dihydrogen reacts with dinitrogen ?

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53. Hydrogen is prepared on an industrial scale _____.

A. from sodium hydride and water

B. from water gas (Bosch process)

C. by Uyeno's method

D. by Haber's process

Answer: B

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54. The most abundant element in the universe is

A. dihydrogen

B. dioxygen

C. dinitrogen

D. silicon

Answer: A

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Critical Thinking

1. The sum of protons, electrons and neutrons in an atom of deuterium is _____.

A. 2

B. 3

C. 4

D. 5

Answer: B

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2. Deuterium differs from hydrogen ?

A. chemical properties

B. physical properties

C. both physical and chemical properties

D. radioactive properties

Answer: B

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

A. They are isotops of each other

B. They have similar electronic configurations.

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

D. Their mass number are in the ratio of 1:2:3.

Answer: C

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4. Which of the following properties decreases from hydrogen $\rightarrow$ deuterium $\rightarrow$ tritium?

A. Relative atomic mass $\left(gmol^{-1}\right)$

B. Density $\left(gL^{-1}\right)$

C. Melting point (K)

D. Active abundance (%)

Answer: D

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5. what happens when hydrogen reacts with alkali metals ?

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6. The catalyst used in Bosch process is _____.

A. Fe_2O_3

B. Ni

C. Fe

D. ThO_2

Answer: A

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7. Complete the chemical reaction :-

CO + H_2 -->

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8. Dihydrogen is used for following EXCEPT _____.

A. for the hydrogenation of vegetable oils

B. in the manufacture of ammoina

C. in oxyhydrogen torches

D. as tracers in the study of reaction mechanism

Answer: D

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9. Alkali metal hydrides react with water to give

A. acidic solution

B. basic solution

C. neutral solution

D. hybride ion

Answer: B

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10. $LiAlH_4$ is obtained by reaching _____ with Al_2Cl_6.

A. LiCi

B. LiH

C. Li

D. LiOH

Answer: B

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11. Metals of groups 7, 8 and 9 do not form metallic hydrides. This is termed as

A. hydride gas

B. dydride shift

C. interstitial gap

D. energy gap

Answer: A

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12. What happen when Lithium Hydride react with dimer of Aluminium chloride ?

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13. What is auto - protolysis of water ?

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14. Explain amphoteric nature of water when it react with NH_3 and H_2S ?

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15. What happens when CaC_2 reacts with H_2O ?

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16. Water reacts with fluorine liberating _____ gas.

A. dihydrogen

B. dioxygen

C. hydrogen fluoride

D. hydrogen peroxide

Answer: B

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17. The approximate mass of tritium oxide molecule is

A. 18 amu

B. 20 amu

C. 22 amu

D. 24 amu

Answer: C

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18. Among the diffrent kinds of water ,_____is vital for life processes.

A. heavy water

B. deuterium water

C. protonium water

D. tritium water

Answer: C

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19. Which of the following method of preparation of H_2O_2 is known as Merck's method?

A.

$$BaO_7.8H_2O(s) + H_2SO_{4(aq)} \rightarrow BaSO_{4(s)} + H_2O_{2(aq)} + 8H_2O(l)$$

B. $Na_2O_2 + H_2SO_4 \rightarrow Na_2SO_4 + H_2O_2$

C. $BaO_2 + H_2O + CO_2 \rightarrow BaCO_3 \downarrow + H_2O$

D. $3BaO_2 + 2H_3PO_4 \rightarrow Ba_3(PO_4)_2 \downarrow + 3H_2O_2$

Answer: B

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20. What happens when Al_4C_3 reacts with H_2O ?

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21. The volume strenght of 3.0 MH_2O_2 solution is

A. 1.87

B. 3.73

C. 16.8

D. 33.6

Answer: D

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22. Decomposition of H_2O_2 is accelerated by

A. traces of acids

B. finely divided metals

C. glycerol

D. alcohol

Answer: B

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23. What happens when SO_3 reacts with H_2O ?

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24. H_2O_2 undergoes self-oxidation and self-reduction to form _____.

A. $H_2O + O_2$

B. $H_2 + O_2$

C. OH^-

D. $O_3 + H_2O$

Answer: A

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

A. $PbO_{2(g)} + H_2O(2(aq)) \rightarrow PbO_s + H_2O_l + O_{2(g)}$

B. $Na_2SO_{3(aq)} + H_2O_{2(aq)} \rightarrow Na_2SO_{4(aq)} + H_2O_l$

C. $2KI(aq) + H_2O_{2(aq)} \rightarrow 2KOH(aq) + I_{2(s)}$

D. $KNO_{2(aq)} + H_2O_{2(aq)} \rightarrow KNO_{3(aq)} + H_2O_l$

Answer: A

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26. When lead sulphide reacts with hydrogen peroxide,The produce formed is :-

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27. _____ is the main energy currency in hydrogen economy.

A. Electricity

B. Water

C. Dihydrogen gas

D. Dioxygen gas

Answer: C

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28. Which of the following is FALSE?

A. Hydrogen is a clean burning fuel.

B. Burning of hydrogen does not produce fossil fuels.

C. Hydrogen is a cheap and renewable source of energy.

D. In hydrogen economy, hydrogen can be easily transported through underground pipeline

Answer: C

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29. Number of nucleons in D_2 molecule is

A. 1

B. 2

C. 3

D. 4

Answer: D

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

A. CH_4

B. NH_3

C. HCl

D. CaH_2

Answer: D

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Competitive Thinking

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

A. halogens

B. alkali metals

C. chalocogens

D. alkaline earth metals

Answer: A

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2. Hydrogen resembles alkali metals in many aspects but differs in _____.

A. metallic character

B. oxide formation

C. sulphide formation

D. halide formation

Answer: A

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3. Hydrogen resembles in many

A. halogens

B. alkali metals

C. both (a) and (b)

D. none of these

Answer: C

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4. Which of the following statement is not correct regarding hydrogen atom?

A. It resmbles halogens in some properties.

B. it resembles alkali metals in some properties

C. it can be placed in group 17 of periodic table

D. it cannot be placed in first group of periodic table.

Answer: D

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5. The composition of tritium is

A. 1 electron, 1 proton, 1 neutron

B. 1 electron, 2 protons, 1 neutron

C. 1 electron, 1 proton, 2 neutrons

D. 1 electron, 1 proton, 3 neutrons

Answer: C

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6. Very pure hydrogen $(99.9\,\%)$ can be made by which of the following processes ?

A. Reaction of methane with steam.

B. Mixing natural hydrocarbons of high molecular weight

C. Electrolysis of water

D. Reaction of salts like hydrides with water.

Answer: D

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

A. Na

B. K

C. Pt

D. Fe

Answer: D

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8. Metal hydride on treatment with water gives :

A. H_2O_2

B. H_2O

C. HCl

D. H_2

Answer: D

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9. The boiling point of water is exceptionally high because

A. there is covalent bond between H and O

B. wate molecule is linear

C. water molecules associate due to hydrogen bonding

D. water molecule is not linear

Answer: C

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

A. 90°

B. 180°

C. 102°

D. 105°

Answer: D

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11. What are the products of auto-photolysis of water?

A. H_2 and O_2

B. steam

C. H_3O^+ and OH^-

D. hydrogen peroxide

Answer: A

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12. One mole of magnesium nitride on reaction with an excess of water gives

A. one mole of ammonia

B. one mole of nitric acid

C. two moles of ammonia

D. two moles of nitric acid

Answer: C

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13. What is super heavy water ?

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14. D_2O is used more in

A. chemical industry

B. nuclear reactor

C. pharmaceutical preparations

D. insecticide preparation

Answer: B

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15. Describe Clark's method to remove hardness of water ?

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

A. C_2D_2

B. CaD_2

C. $Ca_2)D_2O$

D. CD_2

Answer: A

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17. In lab H_2O_2 is prepared by

A. Cold $H_2SO_4 + BaO_2$

B. $HCl + BaO_2$

C. Conc. $H_2SO_4 + Na_2O_2$

D. $H_2 + O_2$

Answer: A

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18. What is the product of the reaction of H_2O_2 with Cl_2?

A. $O_2 + HOCl$

B. $HCl + O_2$

C. $H_2O + HCl$

D. $HCl + H_2$

Answer: B

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

A. 4.8

B. 5.2

C. 8.4

D. 8.8

Answer: C

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

A. 112 mL

B. 224 mL

C. 56 mL

D. 336 mL

Answer: B

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21. A sample of hydrogen peroxide is labelled as 10 volume. Its strength is gL^{-1} is _____.

A. 30.00

B. 60.70

C. 15.17

D. 45.42

Answer: A

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22. When P_4O_{10} is hydrolysed with water ,it forms :-

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

A. 250 mL

B. 300 mL

C. 150 mL

D. 200 mL

Answer: B

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24. What is metallic hydrides ? Explain with examples ?

A. 3

B. 30

C. 60

D. 6

Answer: C

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25. The strength in volumes of a solution containing 30.36 g/L of H_2O_2 is

(Given volume of 1 mole of gas STP = 22.4 litre)

A. 10 volume

B. 20 volume

C. 5 volume

D. 30 volume

Answer: A

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26. Role of hydrogen peroxide iin the following reaction is respectively.

$(i) \quad H_2O_2 + O_3 \rightarrow H_2O + ZO_2$

(ii) $H_2O_2 + Ag_2O \rightarrow Aag + H_2O + O_2$

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: A

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

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

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

C. $2HI + H_2O_2 \rightarrow 2H_2O + I_2$

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

Answer: B

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28. From the following statements regarding H_2O_2, choose the incorrect statements:

A. it can act only as an oxidizing agent.

B. it decomposes on exposure to light.

C. it has to be stored in plastic or wax lined glass bottles in dark .

D. it has to be kept away from dust

Answer: A

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29. Which of the following gas is insoluble in water?

A. SO_2

B. NH_3

C. H_2

D. CO_2

Answer: C

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30. Heavy water is _____.

A. water containing Fe, Cr, Mn

B. water at $0.^{\circ} C$

C. D_2O

D. $H_2.^{18} O$

Answer: C

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Evaluation Test

1. Hydrogen has three isotopes, the number of possible diatomic molecules will be

A. 2

B. 6

C. 9

D. 12

Answer: B

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2. Which of the following metals donot liberate hydrogen from dilute hydrochloric acid ?

A. Zn

B. Mg

C. Fe

D. Au

Answer: D

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

A. $1:1$

B. $1:2$

C. $2:1$

D. $9:4$

Answer: A

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4. Hydrogen ion H^- is isoelectronic with

A. Li

B. He

C. H^+

D. Li^-

Answer: B

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5. Which of the following produces hydrolith with dihydrogen ?

A. Mg

B. Al

C. Cu

D. Ca

Answer: D

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6. State whether given statement is true or false :-

H_2O is non-polar solvent.

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7. Find x and y respectively in the following reactions :

$CaO \xrightarrow{H_2O} x$

$CaC_2 \overset{H_2O}{y} + x$

A. $Ca(OH)_2, C_2H_2$

B. CaH_2, C_2H_2

C. $Ca(OH)_2, CH_4$

D. $Ca(OH)_2, C_2H_6$

Answer: A

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8. Volume strength of H_2O_2 = _____.

A. $11.2 \times \text{Normality}$

B. $11.2 \times \text{Molarity}$

C. $\frac{\text{Normality}}{5.6}$

D. $\frac{\text{Molarity}}{11.2}$

Answer: A

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9. When SO_3 is treated with heavy water the product/s is/are

A. deuterium and sulphuric acid

B. deuterium and sulphurous acid

C. di-deutero sulphuric acid

D. super heavy water

Answer: C

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10. What do you mean by hydroformylation of olefins ?

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11. 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 dissolution of CO_2 in water under pressure.

B. CO and H_2 are fractionally separted using difference in their densities.

C. CO is removed by absorption in aqueous Cu_2Cl_2 solution.

D. H_2 is removed through occlusion with Pd.

Answer: A

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12. Explain water gas shift reaction.

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13. Write the reaction involved in formation of $LiBH_4$

A.

B.

C.

D.

Answer:

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14. What happens when NaH reacts with H_2O :-

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