QUESTION BANK(2020-21)

STANDARD-IX

CHEMISTRY

CHAPTER-1, LANGUAGE OF CHEMISTRY

Q1) Name the following -

1) A group of atoms that carries a charge and behave as a unit---> radical

2) Short form representation for a chemical change ---> chemical equation

3) A negative radical in which a metalloid is a part ---> silicate

4) The concept in which an element lose electrons from its penultimate shell ---> variable valency

5) The common name of the copper sulphate crystals ---> blue vitriol

6) The substances formed as a result of chemical change ---> products

7) An element having valencies 2 and 3 ---> iron

8) The negatively charged ions ---> anions

9) Number of atoms present in one molecule of an element ---> atomicity

10) The formula which gives the simplest whole number ratio of various atoms present in a molecule ---> empirical formula

Q2) Classify the following into-

1) Elements and Compounds--->

Tungsten --- element

Water --- compound

Ammonia --- compound

Hydragyrum --- element

Silicon --- element

Silica --- compound

2) Monovalent, divalent and trivalent radicals--->

Zincate--- divalent

nitride--- trivalent

Permanganate--- monovalent

Chromate--- divalent

Hypochlorite---> monovalent

Borate--- trivalent

Q3) A salt of a metal X is $X_2(PO_4)_3$. Without identifying X, write the molecular formula of its

1) Sulphide-- X_2S_3

2) Hydride-- XH_3

3) Nitride-- XN

4) Carbide-- X_4C_3

Q4) Balancing equations-

1) $2PbS + 3O_2$ --- > $2PbO + 2SO_2$

2) $S + 6HNO_3$ -- > $H_2SO_4 + 6NO_2 + 2H_2O$

3) $Pb_3O_4 + 8HCl$ ---> $3PbCl_2 + 4H_2O + Cl_2$

4) $C + 2H_2SO_4$--- > $CO_2 + 2H_2O + 2SO_2$

5) $Zn + 4HNO_3$--- > $Zn(NO_3)_2 + Zn(NO_3)_2 + 2H_2O + 2H_2O + 2NO_2$

6) $2NaCl + MnO_2 + 3H_2SO_4$--- > $2NaHSO_4 + MnSO_4 + 2H_2O + Cl_2$

7) $2Al + 2NaOH + 2H_2O$ ---> $2NaAlO_2 + 3H_2$

8) $2Ag(NO_3)_2$--- > $2Ag + 2NO_2 + O_2$

9) $2K_2Cr_2O_7 + 8H_2SO_4$ --- > $2K_2SO_4 + 2Cr_2(SO_4)_3 + 8H_2O + 3O_2$

10) $Cl_2 + SO_2 + 2H_2O$ -- > $H_2SO_4 + 2HCl$

Q5) Give reasons-

1) Certain elements exhibit variable valency.

Ans- Atoms of elements that lose electrons from valence shell as well as penultimate shell, exhibit variable valency.

2) In a chemical reaction, the reactants and products are not represented in atomic form.

Ans- Atomic forms are usually unstable and do not exist independently.

3) Why is the symbol of sulphur 'S' , sodium 'Na' and silicon 'Si'.

Ans- The symbol of sulphur is taken from the first letter, therefore 'S'.

For sodium, the symbol is derived from latin name natrium, therefore 'Na'.

For silicon, the first two letters are taken as symbol inorder to avoid repetition, therefore 'Si'.

4) Why should an equation be balanced?

Ans- An equation must be balanced to comply the law of conservation of matter.

Q6) Find the valencies of underlined elements-

1) $\underline{CaF_2} = Ca^2\ F^1$

so ,F = 1(ans)

2) $\underline{N_2}O_5 = N^5\ O^2$

$= N^{5x2}\ O^{2x2} = N^{10}\ O^4$

so, 2N = 10 and N = 5 (ans)

Q7) Calculate the molecular mass-

[H = 1, C = 12, N = 14, O = 16, Cu = 63.5, S = 32]

1) $(NH_2)_2CO$ = 2N + 4H + C + O

= (2x14) + (4x1) + (12) + (16)

= 28 + 4 + 12 + 16

= 60

2) $CuSO_4.5H_2O$ = Cu + S + 4(O) + 10(H) + 5(O)

= Cu + S + 9(O) + 10(H)

= 63.5 + 32 + (9x16) + (10x1)

= 63.5 + 32 + 144 + 10

= 149.5

Q8) Calculate the percentage composition of each element-

[K =39, Cl = 35.5, O = 16]

$KClO_3$ = 39 + 35.5 + (16x3)

= 122.2

K = 39 / 122.5 X 100 = 31.8 %

Cl = 35.5 / 122.5 X 100 = 28.9 %

O = 48 / 122.5 X 100 = 39.1 %

Q9) Write the chemical formula of the following compounds.

(i) Cupric Sulphate

(ii) Ammonium Phosphate

(iii) Sodium Acetate

(iv) Zinc Nitrate

Ans. (i) $CuSO_4$

(ii) $(NH_4)_3PO_4$

(iii) CH_3COONa

(iv) $Zn(NO_3)_2$

Q10) Give the names of the following compounds:

(i)NH_4Cl

(ii) $Zn(OH)_2$

(iii)$KHCO_3$

(iv)$CaSO_4$

Ans. (i) Ammonium chloride

(ii) Zinc hydroxide

(iii) Potassium bicarbonate

(iv) CalciumSulphate

Q11) Balance the following equations:

(i) N_2 + O_2----- > NO

(ii) KNO_3----- > KNO_2 + O_2

(iii) NH_3 + Cl_2 -----> NH_4Cl + N_2

(iv) CH_4 + O_2 ------> CO_2+ H_2O

Ans. (i) $N_2 + O_2$ -----> 2NO

(ii) $2KNO_3$ -----> $2KNO_2 + O_2$

(iii) $8NH_3 + 3Cl_2$ -----> $6NH_4Cl + N_2$

(iv) $CH_4 + 2O_2$ -----> $CO_2 + 2H_2O$

Q12) MSO_4 is a sulphate of a metal. Write down the formula of its

(i) chloride (ii) hydroxide (iii) carbonate (iv)oxide (v) nitrate

Ans. Valency of M is 2.

(i) MCl_2 (ii)$M(OH)_2$ (iii)MCO_3 (iv)MO (iv)$M(NO_3)_2$

Q13) Write the formulae and balance the following chemical equations:

(i) Zinc + dilute sulphuric acid----- > Zinc sulphate + hydrogen

(ii) Copper + conc. Nitric acid -----> Copper nitrate + nitrogen dioxide + water

(iii) Magnesium + nitrogen -----> magnesium nitride

Δ

(iv) Potassium chlorate -----> potassium chloride + oxygen

Ans. (i) $Zn + H_2SO_4$ -----> $ZnSO_4 + H_2$

(Dil.)

(ii) $Cu + 4HNO_3$ -----> $Cu(NO_3)_2 + 2NO_2 + 2H_2O$

(Conc.)

(iii) $3Mg + N_2$ -----> Mg_3N_2

Δ

(iv) $2KClO_3$ -------> $2KCl + 3O_2$

Q14) What is the valency of underlined elements in the following compounds?

(i)$\underline{Ca}Cl_2$ (ii)$\underline{C}Cl_4$ (iii)$\underline{Cu}SO_4$ (iv)$\underline{Mg}3N_2$

Ans. (i) 2 (ii) 4 (iii) 2 (iv) 2

Q15) Identify the cationic (basic radical) and anionic (acidic radical) parts in the following compounds and then write their chemical formulae.

(i) Nickel sulphate (ii) Sodium silicate

Ans.

Basic radical	Acidic radical	Chemical formula
(i) $Ni^{2}+$	$SO_4^{2}-$	$NiSO_4$
(ii) Na+	$SiO_3^{2}-$	Na_2SiO_3

Q16) Give the names of the following compounds:

(i) $HClO$ (ii)$HClO_2$ (iii)$HClO_3$ (iv) $HClO_4$

Ans. (i) Hypochlorous acid

(ii) Chlorous acid

(iii) Chloric acid

(iv) Perchloric acid

Q17) What is a symbol? What is its significance?

Ans. A symbol is a short form that represents an atom of a specific element.

Significance of a symbol:

(i) A symbol represents the name of the element.

(ii) It represents one atom of the element.

(iii) It represents the relative atomic mass of the element.

Q18) Define the following:

(i) Valency (ii) Chemical equation

(ii)Atomic mass unit (iv) Radicals

Ans. (i) Valency: The valency of an element or a radical is defined as the number of hydrogen atoms that combine or displace one atom of that element or radical. In other words, valency is defined as the number of electrons, which an atom can gain/lose/share in a chemical reaction.

(ii) Chemical equation: The symbolic representation of a chemical reaction using symbols and formula of the elements is called chemical equation.

(iii) Atomic mass unit (amu): It is defined as the mass of 1/12th of carbon atom whose mass is 12.

(iv) Radicals: A radical is an atom or group of atoms which does not exist independently but behave as a single unit with a positive or negative ion.

Q19) Why should a chemical equation be always balanced?

Ans. The chemical equation needs to be balanced so that it follows the law of conservation of mass. A balanced equation occurs when the number of different atoms of elements in the reactants side is equal to that of the products side.

Q20) Some elements show variable valencies. Explain

Ans. Some elements show variable valencies because of the different electronic configuration. An atom of an element can sometimes lose more electrons than that are present in its valence shell, i.e. loss from the penultimate shell.

Q21) Determine the molecular mass of the following:

(i) Mg(NO3)2 (ii) Na2SO4

Ans. (i) The molecular mass of $Mg(NO_3)_2$

= 23 + (2×14) + (6×16)

= 24+28+96 = 148 amu

(ii) The molecular mass of Na_2SO_4

= (2×23) + 32 + (4×16)

= 46+32+64 = 142 amu

Q22) What do you understand by polyatomic ions? Give example to support your answer.

Ans. The prefix poly means many. So, a polyatomic ion is an ion which contains more than one atom. Example: Ammonium ion (NH_4^+), Nitrate ion(NO_3^-)

Q23) Why do we use symbol P for phosphorus but K for potassium?

Ans. In the case of phosphorus, first letter of the element is taken as its symbol and it is written as capital, where as in case of potassium, the symbol of the element has been derived from the latin name, Kalium.

Q24) Find the total percentage of Magnesium in magnesium nitrate crystals, Mg(NO3)2.6H2O.

[Mg=24; N=14; O=16 and H=1]

Ans. Molecular weight of $Mg(NO_3)_2.6H2O$

= 24+ 2×(14+18)+6×18

= 24+2×62 + 108

= 24+124+108 = 256 g

% composition of Mg = 24/256 × 100 = 9.375%

Q25) Calculate the percentage composition by weight of the following compounds:

(i)Methane(CH_4) (ii) Hydrochloric acid (HCl)

Ans. (i) Methane:

Chemical formula = CH_4

Relative molar mass= 12+4 = 16 amu

% of Carbon = 12/16 × 100 = 75%

% of Hydrogen = 4/16 × 100 = 25%

(ii) Hydrochloric acid:

- Chemical formula = HCl

Relative molar mass = 1+35.5 = 36.5 amu

% of Hydrogen = 1/36.5 × 100 = 2.73%

% of Chlorine = 35.5/36.5 × 100 = 97.26%

Q26) Give one example:

a. polyatomic cation

b. divalent cation

c. tetra atomic molecule

d. trivalent compound radical

Sol.

a. NH_4^+
b. Mg^{2+}
c. SO_3
d. PO_4^{3-}

CHAPTER-2, CHEMICAL CHANGES AND REACTIONS-

Q1) Name the following-

1) Process of breaking the chemical bonds of reactants and products - chemical reaction

2) Gas formed when ammonium dichromate is heated - nitrogen

3) Type of energy required to break water chemically - electrical energy

4) Residue formed when calcium carbonate decomposes - calcium oxide

5) The displaced product formed when magnesium reacts with silver nitrate solution - silver

6) Promoter used during ammonia preparation - molybdenum

7) Type of reaction where potassium iodide and hydrogen peroxide reacts to give ammonia gas - redox reaction

8) Type of reaction in which radicals of two solutions are exchanged and a soluble salt is formed - double displacement / double decomposition

9) The type of salt kept in dark coloured bottle - silver salts

10) The insoluble salt of lead which is soluble in hot water - lead (II) chloride

Q2) Mention the colour change when-

1) Copper (II) nitrate is heated ---> blue to black

2) Lead (II) carbonate is heated ---> white to yellow

3) Zinc nitrate is heated ---> white to yellow when hot and white when cold.

4) Copper (II) sulphate is heated ---> blue to white

5) Ammonium dichromate is heated ---> orange to green

Q3) Mention the type of reaction-

1) The reaction in which one compound splits into more than one substance due to the action of energy - decomposition reaction

2) The reaction in which an acid and a base reacts to form salt and water only - neutralisation

3) The reaction in which two elements combine to form one compound only - synthesis

4) The reaction in which one element and another compound combine to form another compound - direct combination

5) The reaction in which radicals of two solutions are exchanged and an insoluble salt is formed - precipitation reaction

Q4) Complete the table-

Name of the reaction	**Reaction notation**	**One equation as example**
1) Synthesis	A + B ---> AB	$C + O_2$ ---> CO_2
2) Decomposition	AB ---> A + B	$2Pb_3O_4$ --->6 PbO + O_2
3) Displacement	AB + C ---> AC + B	Zn +2 HCl ---> $ZnCl_2 + H_2$

Q5) Give a balanced equation for each of the following -

1) A synthesis reaction using ammonia as the product.

$N_2 + 3H_2 \rightarrow 2NH_3$

2) An electrochemical reaction using acidified water

$2H_2O \rightarrow 2H_2 + O_2$

3) A precipitation reaction forming calcium carbonate as precipitate

$Ca(NO_3)_2 + Na_2CO_3 \rightarrow CaCO_3 + 2\ NaNO_3$

4) A soluble salt as a product from an insoluble hydroxide

$Pb(OH)_2 + HNO_3 \rightarrow Pb(NO_3)_2 + 2\ H_2O$

Q6) Complete and balance the following reactions:

a. $Fe + O_2 \xrightarrow{\text{Moisture}}$ _____ (rust)

b. $Cu + O_2$ ---------- (black)

c. $Ag + S$ ---------- (black)

d. $2AgNO_3 \xrightarrow{\triangle}$ ----------(silvery grey)+---------+--------
-(reddish brown)

e. $P_2O_5 + H_2O$ ---------- (Phosphoric Acid)

Ans.

a. $4Fe + O_2 \xrightarrow{\text{Moisture}} 2Fe_2O_3$ (rust)

b. $2Cu + O_2 \rightarrow 2CuO$ (black)

c. $2Ag + S \rightarrow Ag_2S$ (black)

d. $2AgNO_3 \xrightarrow{\triangle} 2Ag_{(silver)} + O_2 + 2NO_2$ (reddish brown)

e. $P_2O_5 + 3H_2O \rightarrow 2H_3PO_4$ (Phosphoric Acid)

Q7) Complete the following flow charts. Also balance them:

a. $K + O_2 \rightarrow$ [ ] + H_2O ↓ [ ]

(Caustic potash)

[ ]

b.$Ca+O_2$ ⟶ + H_2O

↓

[ ]

(Slaked lime)

Ans

a. $4K + O_2$ ⟶ [$2K_2O$] + $2H_2O$

↓

[4KOH]

b. $2Ca + O_2$ ⟶ [$2CaO$] $+2H_2O$

↓

[$2Ca(OH)_2$]

Q8) Give balanced chemical equations for the action of heat on:

a. Lead nitrate

b. Sodium nitrate

c. Hypochlorous acid

d. Silver nitrate

Ans.

a. $2Pb(NO_3)_2 \xrightarrow{\Delta} 2PbO + 4NO_2 + O_2$
b. $2NaNO_3 \xrightarrow{\Delta} 2NaNO_2 + O_2$
c. $2HClO \xrightarrow{\Delta} 2HCl + O_2$
d. $2AgNO_3 \xrightarrow{\Delta} 2Ag + O_2 + 2NO_2$

Q9) Classify the following reactions on the basis of energy changes:

a. $2NaCl \xrightarrow{\text{Electricity}} 2Na + Cl_2$
b. $3O_2 \xrightarrow{\text{UV radiation}} 2O_3$
c. $N_2 + O_2 \longrightarrow 2NO - \Delta$
d. $2H_2 + O_2 \longrightarrow 2H_2O + 136kcal$
e. $C + 2S \longrightarrow CS_2 - 22kcal$

Ans.

a. Electrochemical reaction
b. Photochemical reaction
c. Endothermic reaction
d. Exothermic reaction
e. Endothermic reaction

Q10) Indicate the types of the following reactions:

a) $Cl_2 + 2KBr \longrightarrow 2KCl + Br_2$
b) $Fe + CuSO_4 \longrightarrow FeSO_4 + Cu$
c) $PbO_2 + SO_2 \longrightarrow PbSO_4$
d) $AgNO_3 + NaCl \longrightarrow AgCl\downarrow + NaNO_3$
e) $2KClO_3 \longrightarrow 2KCl + 3O_2$

Ans.

a) Displacement
b) Displacement
c) Direct Combination
d) Double decomposition / Precipitation
e) Decomposition

Q11) Give your observations along with equations:

a. When sulphuric acid is added to barium chloride
b. When silver nitrate is added to sodium chloride
c. When sodium hydroxide is added to ferric chloride
d. When copper rod is placed in silver nitrate solution
e. When chlorine gas is passed in sodium bromide solution

Ans.

a. White precipitates are formed.

$BaCl_2 + H_2SO_4 \longrightarrow BaSO_4 \downarrow + 2HCl$

b. White precipitates are formed.

$AgNO_3 + NaCl \longrightarrow AgCl \downarrow + NaNO_3$

c. Reddish brown precipitates are formed.

$FeCl_3 + 3NaOH \longrightarrow Fe(OH)_3 \downarrow + 3NaCl$

d. The solution turns blue with silvery deposit

$Cu + 2AgNO_3 \longrightarrow Cu(NO_3)_2 + 2Ag$

e. Reddish brown liquid is formed

$2NaBr + Cl_2 \longrightarrow 2NaCl + Br_2$

Q12) Complete and balance the given equations giving conditions:

a. $CO_2 + H_2O \longrightarrow$
b. $CH_4 + O_2 \longrightarrow$
c. $KClO_3 \longrightarrow$
d. $O_2 \xrightarrow{\text{Photochemical reaction}}$
e. $Mg + N_2 \longrightarrow$

Ans .

a. $6CO_2+6H_2O \xrightarrow[\text{chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2 + 6H_2O$
b. $CH_4+2O_2 \longrightarrow CO_2+2H_2O+\text{Heat}+\text{Light}$
c. $2KClO_3 \xrightarrow{MnO2} 2KCl+3O_2$
d. $3O_2 \xrightarrow{\text{UV Rays}} 2O_3$
e. $3Mg+N_2 \xrightarrow{\text{Burn}} Mg_3N_2$

Q13) Name the types of the following equations:

i. $NH_4Cl \longrightarrow NH_3+HCl$
ii. $Cl_2+2KBr \longrightarrow 2KCl+Br_2$
iii. $2HgO \longrightarrow 2Hg+O_2$
iv. $Fe+CuSO_4 \longrightarrow FeSO_4+Cu$
v. $CaCO_3 \longrightarrow CaO+CO_2$

Ans.

i. Decomposition
ii. Displacement
iii. Decomposition
iv. Displacement
v. Decomposition

Q14) Give one word for the following:

a. Reddish brown compound formed when iron is exposed to moist air
b. Substances which react together in a chemical reaction
c. A substance which increases or decreases the rate of chemical reaction
d. A substance which increases the efficiency of a catalyst
e. An insoluble green carbonate
f. Chemical reaction in which heat is evolved
g. Chemical reaction in which heat is absorbed

h. Chemical reaction which take place in the presence of electricity
i. A nitrate that decripitates on heating

j. The gas evolved when chlorine water is exposed to sunlight

Ans .

a. Rust
b. Reactants
c. Catalyst
d. Promoter
e. Copper carbonate
f. Exothermic reaction
g. Endothermic reaction
h. Electrochemical reactions
i. Lead nitrate
j. Oxygen

Q15) Match the following:

COLUMN -1	COLUMN-2
a. $A + B \rightarrow C$	(i) Double displacement (d)
b. $A \rightarrow B + C$	(ii) Decomposition (b)
c. $A + BC \rightarrow AC + B$	(iii) Thermal dissociation (e)
d. $AB + CD \overset{\triangle}{\Rightarrow} AD + CB$	(iv) Synthesis (a)
e. $A \leftrightarrow B + C$	(v) Displacement (c)

Q16) Complete the table :

Reaction	Gas evolved	Type of reaction
Copper carbonate is heated	(i)----------	(ii)----------
$(NH_4)_2Cr_2O_7$ is heated	Nitrogen	(iii)----------
Zinc added to dil hydrochloric acid	(iv)----------	Simple displacement reaction

Sol. (i) Carbon dioxide

(ii) Thermal decomposition reaction

(iii) Thermal decomposition reaction

(iv) Hydrogen

CHAPTER-3, WATER-

Q1) Name the following-

1) The substance which disappears in the solvent - solute

2) A solution in which the amount of solute is relatively large - concentrated solution

3) A solution which can hold or contains more of the solute at a given temperature -supersaturated

4) The amount of solute in grams that saturates 100g of water at a fixed temperature -solubility

5) The physical state in which solubility of the solute is independent of change in pressure -solid

6) The factor which decides the colour and geometric shape of the crystals - water of crystallisation

7) A drying agent used to absorb moisture from basic gases - calcium oxide

8) The salt which causes temporary hardness in water - calcium bicarbonate / magnesium bicarbonate

9) The salt used to remove temporary and permanent hardness - sodium carbonate

10) The solvent for nail polish - acetone

11) The common name for calcium sulphate dihydrate - gypsum

12) The common name for magnesium sulphate heptahydrate - epsom salt

Q2) Classify the following-

If the temperature of the solution increases, whether the solubility of the following compounds increases , decreases or increased slightly-

KNO_3 ---> increases

NaCl ---> increases slightly

$NaNO_3$ ---> increases

$CaSO_4$ ---> decreases

$CuSO_4$ ---> increases

$Ca(OH)_2$ ---> decreases

Q3) Give reasons-

1) Table salt becomes moist and sticky during the rainy season

Ans- Table salt contains traces of deliquescent substances like $CaCl_2$ and $MgCl_2$ as impurities that absorb moisture in the rainy season and makes it moist and sticky.

2) Concentrated sulphuric acid is a drying as well as dehydrating agent.

Ans- Concentrated sulphuric acid is a hygroscopic substance, so it is used as a drying agent. It also exhibits a strong affinity for water that removes chemically combined water from the substance. so it acts as dehydrating substance.

Q4) Fill in the blanks

a. Water dissolves many substances therefore it is called a _____.

b. Presence of impurities in water _____ the boiling point and _____ the freezing point of water.
c. Pure water is a _____ conductor of heat and electricity.
d. A _____ solution dissolves no more solute at a particular temperature.
e. _____ removes both temporary and permanent hardness of water.

Q5) State whether the following statements are true or false. Then rewrite the correct statement

a. Increase in the pressure on the surface of water decreases the boiling point of water.
b. Solubility of gases in water increases on increasing the temperature.
c. Temporary hardness of water can be removed by boiling but permanent hardness cannot.

Q6) Name the following

a. The continuous circulation of water in nature.
b. Two different calcium salts one causing temporary and the other causing permanent hardness.
c. A sodium salt which removes both temporary and permanent hardness of water.
d. The crust or boiler scale deposited on the inner walls of a boiler.
e. A liquid dehydrating substance.
f. A drying agent for ammonia.
g. A blue salt which becomes white on heating.
h. The gas liberated when potassium nitrate is heated.
i. A solvent for iodine.

j. An alloy of copper and zinc.

Q7) Match the following:

Column I		Column II
(i)	Anhydrous salts	a) Distilled water
(ii)	Deliquescent substance	b) Sodium chloride
(iii)	Chemically pure water	c) Ferric chloride
(iv)	Drying or desiccating agent	d) Washing soda
(v)	Efflorescent substance	e) Fused $CaCl_2$

Q8) Multiple choice questions:

(i) The purest form of natural water is

a) Rain water
b) Sea water
c) Well water
d) Spring water

(ii) Which of the following do not cause hardness of water?

a) Hydrogen carbonates of Ca^{2+} and Mg^{2+}

b) Chlorides of Ca^{2+} and Mg^{2+}

c) Carbonates of Ca^{2+} and Mg^{2+}

d) Sulphates of Ca^{2+} and Mg^{2+}

(iii) Temporary hardness in water is caused by

a. Chlorides if sodium and magnesium

b. Sulphates of calcium and potassium
c. Hydrogen carbonates of calcium and magnesium
d. Hydrogen carbonates of sodium, and potassium

Answers:

4) Fill in the blanks

a. Universal solvent
b. Increase, decrease
c. Bad
d. Saturated
e. Sodium carbonate (washing soda)

5) True or false

a. False :increase in pressure on the surface of water increases the boiling point
b. False: solubility of gases i n water increases on increasing the pressure or
solubility of gases in water decreases on increasing the temperature.
c. True

6) Name the following

a. Water cycle
b. Calcium bicarbonate and Calcium chloride
c. Washing soda
d. Calcium carbonate or Magnesium carbonate
e. Concentrated sulphuric acid.
f. Quick lime
g. Blue vitriol

h. Oxygen
i. Ethyl alcohol
j. Brass

7) Match the following

(i)- b

(ii)-c

(iii)-a

(iv)-e

(v)-d

8) Multiple choice questions

1) a
2) c
3) c

Q9) Give reasons for the following

a. Ammonia gas is not dried by passing through concentrated sulphuric acid
b. Sodium chloride forms moist lumps during rainy seasons

Answers

a. Ammonia gas is basic in nature. If this gas is passed into solution containing concentrated sulphuric acid, it reacts with ammonia forming ammonium sulphate. Hence, it is never dried by passing through concentrated sulphuric acid.

b. Sodium chloride contains impurities like magnesium chloride which is deliquescent in nature and absorbs moisture forming lumps of sodium chloride.

Q10) Give one example of the following solutions

a. Solid in solid
b. Solid in liquid
c. Liquid in gas
d. Gas in gas
e. Liquid in liquid

Q11) Match the following solutes with their solvents

(i) Sulphur	(a) Oxalic acid
(ii) Paraffin wax	(b) Methylated spirit
(iii) Rust	(c) Carbon disulphide
(iv) Chlorophyll	(d) Ethyl alcohol
(v) Iodine	(e) Turpentine oil

Answers

10) Give one example of the following solutions

a. alloys such as brass
b. saline water
c. moisture in air
d. chlorine in air
e. alcohol in water

11) Match the following solutes with their solvents

(I) c

(ii)e

(iii)a

(iv)b

(v)d

Q12) Name the drying agents for the following gases

i. Chlorine – concentrated sulphuric acid
ii. HCl —– concentrated sulphuric acid
iii. Ammonia – Quick lime
iv. Sulphur dioxide -– concentrated sulphuric acid

Q13) Give two differences between deliquescent substances and hygroscopic substances

Deliquescent substances	Hygroscopic substances
These are solids, crystalline in Nature	They may be crystalline solids or liquids
They absorb moisture from the atmosphere and dissolves in it to form saturated solutions	They absorb moisture from the atmosphere and become wet but do not form saturated solution

Q14) How can a saturated solution be converted to and unsaturated solution?

Ans. A saturated solution be converted to and unsaturated solution

i. By adding solvent
ii. Heating the solution or increasing the temperature

Q15) What is the effect of increasing and deceasing temperature on the solubility of a gas in a liquid?

Ans. On increasing the temperature the solubility of the gas in a liquid decreases, Whereas on decreasing temperature, the solubility increases. This shows that solubility of a gas in a liquid is inversely proportional to temperature.

Q16) What is the effect of increasing and deceasing pressure on the solubility of a gas in a liquid?

Ans. On increasing the temperature the solubility of the gas in a liquid decreases, Whereas on decreasing temperature, the solubility increases. This shows that mass of a given volume of gas which dissolves in liquid at a constant temperature is directly proportional to the pressure in the surface of the liquid and thus in accordance with Henry's law

CHAPTER-4, ATOMIC STRUCTURE-

Q1) Name the following-

1) The smallest particle of an element - atom

2) The sub-atomic particle which is absent in protium - electron

3) The single word used to describe protons and neutrons together in an atom - nucleons

4) The two fundamental particles which are equal in a neutral atom - protons and electrons

5) The charged atom formed when proton numbers are greater than electron numbers - cation

6) Different atoms of the same element having the same atomic number but different mass numbers - isotopes

7) The configuration in which a neutral atom has eight electrons in its valence shell - octet configuration

Q2) Classify the following into ionic and covalent compound-

1) Ammonia ---> covalent compound

2) Water ---> covalent compound

3) Sodium chloride ---> ionic compound

4) Methane ---> covalent compound

5) Magnesium chloride ---> ionic compound

Q3) Three elements K,L,M,N and O have the following information-

K has 17p, 18 n, L has 13 e, 14n, M has 6p, atomic mass = 12, N has 9e, 10n

O has 6p, atomic mass = 14

Answer the following questions-

1) Which one is a metal ---> L

2) Which are non-metals ---> K, M, N, O

3) Which are isotopes ---> M, O

4) Which one is a halogen ---> K

5) Which can form a cation ---> L

Q4) The atomic number of an element E is 19 and its atomic mass is 39-

1) State its proton, electron and neutron number

Ans- p = 19, e = 19, n = 20

2) Write the electronic configuration of E

Ans- 2,8,8,1

3) whether it forms a cation or an anion?

Ans- Cation

4) Write equation for the formation of ion of E.

Ans- $E - 1e \rightarrow E^{+}$

Q5) ***Give the information conveyed by the symbol*** $^{35}_{17}Cl$***.***

Ans. Information conveyed by the given symbols are:

(i) Atomic number = 17

(ii) Mass number = 35

(iii) Number of electrons = 17

(iv) Number of protons = 17

(v) Number of neutrons= 35-17 = 18

(vi) Electronic configuration = 2,8,7

(vii) Metal or non -metal = Non-metal

(viii) Valency=1

Q6) ***Give three properties of isotopes.***

Ans. (i) Isotopes have similar chemical properties.

(ii) Isotopes differ in physical constants and weights.

(iii) Isotopes occupy the same position in the periodic table.

Q7) ***Why do isotopes have similar chemical properties ?***

Ans. Isotopes of an element have same atomic number, i.e., same number of electrons with similar electronic configuration. Due to same number of valence electrons, their combining capacity will be same resulting in similar chemical properties.

Q8) ***Why do isotopes have different physical constants and weight?***

Ans. Mass number depends on the number of neutrons. Since isotopes differ in the number of neutrons in their nucleus. They also differ in those physical properties which are dependent on mass. For example- weight, density, etc.

Q9) ***Why do isotopes occupy the same position in the periodic table?***

Ans. Elements are arranged in the periodic table in order of increasing atomic numbers. Since isotopes have the same atomic number, they occupy the same position in the periodic table.

Q10) ***Match the atomic number 4, 14, 8, 15 and 19 with each of the following:***

(a) **A solid non-metal of valency 3**
(b) **A gas of valency 2**
(c) **A metal of valency 1**

(d) **A non-metal of valency 4**

Ans.

(a) 15
(b) 8
(c) 19
(d) 14

Q11) ***An atom X has 2,8,7 electrons in its shell. It combines with Y having 1 electrons in its 3rd shell.***

(a) What type of bond will be formed between X and Y?
(b) Write the formula of the compound formed.

Ans.(a) Ionic bond

(b) YX

Q12) ***An element A has electronic arrangement 2,8,2. The element B has electronic configuration 2,8,7. Explain what happens to A and B when they combine to form ionic compound? Also, give the formula of ionic compound.***

Ans. A (2,8,2) loses two electrons forming A^{2+} ion (2,8)

B (2,8,7) gains one electron forming B- ion (2,8,8)

When A and B combine

A^{2+} B^{-1}

AB_2

Q13) ***Give one word for the following :***

(i) Atoms of the same element having different masses. - Isotopes

(ii) Atoms of different elements having the same atomic mass. - Isobars

(iii) Total number of protons and neutrons. - Mass number

(iv) The outermost electron of an atom. - Valence electrons

(v) Maximum number of electrons present in a shell are given in the formula. - $2n^2$

(vi) The central, heavy part of the atom containing neutrons and protons. - Nucleus

(vii) The no. of protons present in the nucleus of an atom. - Atomic number

(viii) Elements having 1,2 or 3 electrons in their outermost orbit. - Metals

(ix) Elements having 4,5,6,7 or 8 electrons are known as. - Non-metals

Q14) ***An element L consists of molecules. What type of bonding is present in the particles that make up L?***

Ans. Covalent bonding.

Q15) There are three elements E, F and G with atomic numbers 19, 8 and 17 respectively.

(i) Classify the elements as metals and non-metals.

(ii) Give the molecular formula of the compound formed between E and G and state the type of chemical bond in this compound.

Ans. **(i)**Non-metal - F, G

Metal - E

(ii) EG, ionic bond.

Q16) ***A compound X consists of only molecules. Hence, X will have :***

(a) A crystalline hard structure
(b) A low melting point and low boiling point
(c) An ionic bond
(d) A strong force of attraction between its molecules.

Ans. A low melting point and low boiling point.

Q17) ***The molecule contain a triple covalent bond is:***

(a) Ammonia
(b) Methane
(c) Water
(d) Nitrogen

Ans. Nitrogen

Q18) State the type of bond in the following molecules:

(a) NaCl - Electrovalent

(b) CaO- Electrovalent

(c) N_{2-} Covalent

(d) CCl_{4-} Covalent

Q19) A metal M with valency 3 combines chemically with a diatomic non-metal Y with valency 2:

(a) write the formula of the compound formed by M and Y –M_2Y_3

(b) Write equations to show the formation of ions by M and Y

Ans. $M - 3e^- \rightarrow M^{+3}$

$Y + 2e^- \rightarrow Y^{2-}$

(c)Write balance chemical equation for the reaction between X and Y

Ans. $4M+3Y_2 \rightarrow 2M_2Y_3$

STANDARD - IX (SECOND TERM)

QUESTION BANK (2019 - 20)

CHEMISTRY

CHAPTER - 5, THE PERIODIC TABLE

Q1) Name the following -

1) The name assigned to groups 1, 2, 13 and 17 ---> normal elements

2) The concept in which gradual change in periodic properties is seen with the increase in atomic number ---> periodicity

3) The periodic property which determines the distance between the centre of the nucleus and the outer most shell of the atom ---> atomic radius

4) The group having inert and monoatomic elements ---> Group 18

5) The period number of an element having 14 protons ---> period 3

6) The longest period in the long form periodic table ---> Period 7

7) The amphoteric metal of Period-3 ---> aluminium

8) The name assigned to elements placed in the middle of the periodic table ---> transition elements

9) The two series of elements placed at the bottom of the periodic table ---> lanthanides and actinides

10) The factor that changes gradually from left to right of a period ---> number of electrons and protons

Q2) Differentiate in one point -

Normal elements and transition elements -

Normal elements	**Transition elements**
1) These elements have incomplete valence shell	1) These elements have incomplete valence shell as well as penultimate shell

Q3) The table below shows a part of the periodic table with normal elements. Some elements are shown with their symbols while others are shown with letters. Basing on this, answer the following questions -

2nd period -	**Li**	**-**	**D**	**-**	**-**	**O**	**J**	**Ne**
3rd period -	**A**	**Mg**	**E**	**Si**	**-**	**H**	**M**	**-**
4th period -	**R**	**T**	**I**	**-**	**Q**	**U**	**-**	**Y**

1) Identify the most electro-positive group --->Group I

2) Identify the haogens ---> J , M

3) Identify the element from the period -3 which is a metalloid ---> Si

4) How many valence electrons are present in Y ---> 8

5) Identify the noble gas of the fourth period ---> Y

Q4) Give one word answers.

1. ***A table or a chart in which elements are arranged in periods and groups.***
2. ***Classification in which elements are grouped in groups of three.***
3. ***Classification in which first and eighth elements are similar.***
4. ***Law that states that the properties of elements are periodic functions of their atomic masses.***
5. ***Scientist who left gaps in his periodic table.***

Q5) Fill in the blanks with suitable words.

1. ***_____character of an element is the tendency of an atom to lose electrons.***
2. ***_____and_____do not find a place in the periodic table.***
3. ***_____is the distance from the centre of its nucleus to the orbit of electrons.***

4. ***As we move down a group_____remains same.***
5. ***Metals form_____oxides.***

Q6) Give one word answers.

1. ***In which blocks are the inner transition elements placed ?***
2. ***What are the elements of s and p block known as ?***
3. ***What are the group 17 elements known as ?***
4. ***Name the scientist who gave the modern periodic law.***
5. ***What are the elements of the third period known as?***

Answers :

4)

1. Periodic table
2. Dobreiner's triad
3. Newland's law of octaves
4. Mendeleev's periodic law
5. Mendeleev

5)

1. Metallic
2. Lanthanides, actinides
3. Atomic radii
4. Number of valence electrons
5. Basic

6)

1. *f* block
2. Representative element
3. Halogens
4. H.G.J Moseley
5. Typical elements

Q7) The elements A and B have electronic configurations (2,8,18,2) and (2,6) respectively.

1. ***To which periods A and B belong ?***
2. ***To which group A and B belong ?***

Ans.

1. A belongs to 4th period and B belongs to 2nd period
2. A belongs to 2^{nd}/2A group , B belongs to 16^{th}/6A group

Q8) An element with atomic number 11 is an alkali metal. Into which families shall you place elements with atomic numbers 10 and 12 respectively ?

Ans. Atomic no. 10 - inert gases
Atomic no. 12 -alkaline earth metals

Q9) Give the name and symbol of each of the following elements that occupy each if the following positions in Modern periodic table.

1. ***Period 2, group II A***
2. ***Period 2, group VI A***
3. ***Period 1, group I A***
4. ***Period 3, group VII A***
5. ***Period 4, group I A***

Ans.

1. Beryllium (Be)
2. Oxygen (O)
3. Hydrogen (H)
4. Chlorine (Cl)
5. Potassium (K)

Q10) Choose the odd one out in the following lists of elements with reasons.

1. ***F, Cl, Br, Na***
2. ***Li, Na, K, Ca***
3. ***C, B, Be, Si***
4. ***Mg, Ca, Na, He***
5. ***Ne, Ar, Kr, Fr***

Ans.

1. Na – it is a metal and rest are non- metals.
2. Ca--it is an alkaline earth metal and rest are alkali metals.
3. Si – it belongs to 3rd period and rest belong to 2nd period.
4. He—it is a noble gas and rest are metals.
5 Fr—it is an alkali metal and rest are noble gases.

Q11) Refer to the following table and answer the questions:

1																	2
3	4 A											5	6	7 B	8	9	10 C
11 D	12											13	14	15	16E	17	18
19	20	21 F	22	23	24	25 G	26	27	28	29	30	31	32	33	34	35 H	36 I

Which of the lettered elements are:

1. ***Inert gas(es)***
2. ***Transition element(s)***
3. ***Alkali metal(s)***
4. ***Alkaline earth metal(s)***
5. ***Halogen(s)***
6. ***Form(s) diatomic molecule***

Ans.

1. C, I
2. F, G
3. D
4. A
5. H
6. B, H

Q12) Inert gases have zero valence. Why ?
Ans. Inert gases have zero valence as they can neither lose nor gain electrons as they have complete octet(except helium that has complete duplet).

Q13) Give reasons:
1. ***Metals act as reducing agents***
2. ***Non metals act as oxidizing agents***

Ans.
1. Metals can easily lose their outermost 1, 2 or 3 electrons to complete their outermost orbit, hence they are reducing agents.
2. Non metals can easily gain electrons to complete their outermost orbit, hence they are oxidizing agents.

Q14) How are cations and anions formed?
Ans. Metals lose electrons to form positively charged particles called cations, whereas non metals gain electrons to form negatively charged particles called anions.

Q15) Elements X, Y, and Z are elements of a Döbreinertriad.ig the atomic mass of X is 7 and that of Z is 39 what should be the mass of Y ?
21
Ans. Average atomic masses of X and Z = 7+39 /2 = 23.
So according to Döbreiner's law of triads, the mass of Y =23.

Q16) An element belongs to the 1st group and 3rd period if the periodic table. Find out:
1. ***Number of valence electrons in the element***
2. ***Is it a metal or a non metal***
3. ***Name of the element***
4. ***Formula of its compound with chlorine***
5. ***Is it an ionic or a covalent compound?***

Ans.
1. 1
2. It is a metal
3. Sodium
4. NaCl
5. ionic compound.

Q17) The atomic numbers of 3 elements A, B and C are given below
A-11, B-13, C-18
1. ***Which element belongs to group 1 ?***
2. ***Which element belongs to group 13 ?***
3. ***Which element belongs to group 18 ?***

4. To which period do these elements belong ?

Ans. 1.A
2. B
3.C
4. These elements belong to period 3

Q18) Alkali metals are good reducing agents. Give reason.

Ans. Alkali metals have 1 electrons in their valence shell hence they can easily lose or donate electrons.

Q19) Do as directed*:*
(i).O, Be, Ne, Li (arrange in increasing order of atomic size)
(ii).Li, Cs, K, H (arrange in increasing order of shells)
(iii).Ne, Ar, Kr, He (arrange in increasing order of number of protons)

Ans.
(i).Ne, O, Be, Li
(ii).H, Li, K, Cs
(iii).He, Ne, Ar, Kr

Q20) Whether increases/decreases/remain same:

(i) Number of shells in a period

(ii) Number of shells in a group

(iii) Number of valence electrons in a period

(iv) Number of valence electrons in a group

Ans. (i) Remain same

(ii) Increases

(iii) Increases

(iv) Remain same

CHAPTER- 6, HYDROGEN

Q1) Name the following -

1) The dilute acid which is not used to prepare hydrogen using metals ---> dilute nitric acid

2) The type of metals that can displace hydrogen from alkalis ---> amphoteric metals

3) Solvent used to remove arsine gas ---> silver nitrate solution

4) The drying agent for hydrogen gas ---> anhydrous calcium chloride

5) The solvent used to remove carbon-monoxide gas ---> ammoniacal cuprous chloride

6) The type of reaction in which both oxidation and reduction reaction takes place simultaneously ---> redox reaction

7) The type of salts kept in dark room ---> silver salts

8) A mixed acid anhydride ---> nitrogen dioxide

9) A slow oxidation process ---> rusting

10) The gas mixture produced when steam is passed over white hot coke ---> water gas

Q2) Differentiate in one point -

Oxidising agents and reducing agents -

Oxidising agents	**Reducing agents**
1) These substances lose oxygen or electro-negative radical or gains hydrogen or electro-positive radical or accepts electrons.	1) These substances gain oxygen or electro-negative radical or loses hydrogen or electro-positive radical or donates electrons.

Q3) choose from the following -

Lead , iron , magnesium , sodium , hydrogen

1) The displaced product when zinc reacts with sodium hydroxide ---> hydrogen

2) The metal which does not displace hydrogen from dilute acid but able to displace from alkali ---> lead

3) The metal displaces hydrogen from cold water ---> sodium

4) The metal displaces hydrogen from steam and boiling water but not from cold water ---> magnesium

5) The metal which displaces hydrogen from steam and is reversible ---> iron

Q4) Classify the following into oxidation and reduction -

1) Fe^{3+} ---> Fe^{2+} Reduction

2) Fe ---> Fe^{2+} Oxidation

3) Fe^{3+} ---> Fe Reduction

4) Fe ---> Fe^{3+} oxidation

5) Fe^{2+} ---> Fe^{3+} Oxidation

Q5) Why is H^+ ion known as proton?

A. Hydrogen is composed of 1 electron and 1 proton. When it loses one electron, it is left only with a proton. Thus, H^+ ion is also known as proton.

Q6) Name any two compounds where hydrogen forms stable compounds with non-metals.

A. Water(H_2O), hydrogen sulphide(H_2S)

Q7) Give two reactions where hydrogen acts as a reducing agent.

A. (i) $CuO + H_2 \xrightarrow{\text{(Heat)}} Cu + H_2O$

In this reaction, hydrogen acts as a reducing agent, it reduces CuO to Cu amd itself gets oxidised to water.

(ii) $2H_2 + O_2 \xrightarrow{\text{(heat)}} 2H_2O$

Q8) Answer the following questions with regard to laboratory preparation of hydrogen :

(i) Name the reactant taken for the preparation of hydrogen.

A. Granulated zinc and dilute sulphuric acid

(ii) How is hydrogen collected ?

A. Downward displacement of water.

(iv) Why is hydrogen collected by above stated method?

A. It is collected by the above stated method because:

- It is almost insoluble in water.
- It forms an explosive mixture with air.

(v) Name the impurities present in hydrogen gas.

A. Impurities present in hydrogen gas are of arsine, phosphine, hydrogen sulphide, sulphur dioxide, carbon dioxide, oxides of nitrogen and water vapour.

Q9) Give the chemical equations for the following :

(i) Hydrogenation of ethene

$C_2H_4 + H_2 \xrightarrow[\text{nickel}]{\text{(Heat)}} C_2H_6$

(Ethene) (ethane)

(ii). Reduction of litharge

$PbO + H_2 \xrightarrow{\text{(Heat)}} Pb + H_2O$

Litharge (Yellow) lead (silvery white)

(iii) . Production of water gas

$C + H_2O \xrightarrow[1000°c]{\text{White steam Hot Coke}} CO + H_2$

water gas

(iv). Electrolysis of water

$2H_2O$ ----------> $2H_2(g)$ + $O_2(g)$

Acidulated (at cathode) (at anode)

Water

(v) . Formation of sodium hydride

$2Na + H_2$ ..... > $2NaH$

Sodium hydrogen sodium hydride

Q10) Answer the following questions with regard to Haber's process :

(i) Name the reactants and the ratio in which they are taken.

A. Nitrogen and hydrogen are taken in 1:3 ratio

(ii) . Which catalyst is used in Haber's process ?

A. Iron is taken as catalyst and molybdenum as promoter .

(iii) . Give the temperature and pressure used in Haber's process.

A. Temperature is 450°c and pressure is 200 - 900 atm .

(iv) . Give the chemical equation for Haber's process.

A. $N_2 + 3H_2$ ----------> $2NH_3(g)$

←---------

(Fe/Mo) (450°c/200atm)

(v). Is this reaction reversible or irreversible?

A. The reaction is reversible.

Q11) Give one word answers for the following:

1. Formula of water gas - $CO + H_2$
2. Compound formed when zinc reacts with KOH - potassium zincate (K_2ZnO_2)
3. Metal which burns with a lilac flame - potassium
4. Atomicity of hydrogen - 2
5. Metal which reacts reversibly with steam - iron
6. Solution used to remove carbon monoxide - ammoniacal cuprous chloride
7. Zinc which contains copper as impurity - granulated zinc
8. A solution which absorbs hydrogen sulphide - lead nitrate
9. Arsine and phosphine are removed by - silver nitrate solution
10. Method used to collect hydrogen - downward displacement of water

Q12) Match the following :

Column I	column II
(i) Rotten egg Smell .	(a) NH_3
(ii). Greenish yellow Gas .	(b) occlusion
(iii). Water gas	(c) H_2S
(iv). Haber's process	(d) Cl_2
(v) . Adsorption of Hydrogen	(e) $CO+H_2$

Answers

(i).(c) (ii). (d) (iii). (e)

(iv).(a) (v). (b)

Q13) When neutral gas 'A' which burns with popping sound is passed through boiling yellow non-metal 'B' it forms gas 'C'.

(i) identify A,B and C.

A. A= hydrogen
B= Sulphur
C= hydrogen sulphide

(ii) give balanced chemical equation for the reaction.

A. H_2 + S ----------> H_2S
'A' boiling 'C'
'B'

(iii) give the characteristics odour of gas 'C'.

A. Rotten egg smell.

(iv) give the confirmatory test of gas 'C'.

A. Gas 'C' turns lead acetate solution black.

(v) Name the oxidation product of gas 'A' . Give two test for the named product.

A. The oxidation product of gas 'A' is water .
The two test for water are:

a. It turns anhydrous copper sulphate from white to blue.
b. It turns anhydrous cobalt chloride from blue to pink.

Q14) Two neutral gases 'A' and 'B' undergo synthesis reaction to form a basic gas 'C' .

1. Identify A,B and C.

A. A= nitrogen
B= hydrogen
C= ammonia

2. Name the process by which gas 'C' is manufactured. Give balanced chemical equation also.

A. Haber's process:

$N_2 + 3H_2 \xrightarrow[\text{(Fe-Mo) (450-500°c)}]{\text{(200-1000atm)}} 2NH_3$

3. What do you observe when gas 'C' comes out in contact with

(a). Moist red litmus paper?
(b). Concentrated hydrochloric acid?

A. (a) it turns blue
(b) it gives dense white fumes .

Q15) State whether the following statements are 'true' and 'false'. If false then rewrite the correct statement.

1. Pure hydrogen burns quickly in air with a green flame forming water.

A. False; pure hydrogen burns quietly in air with a pale blue flame forming water.

2. Conc.H2SO4 reacts with zinc to liberate hydrogen.

A. False; dilute H2SO4 reacts with zinc to liberate hydrogen .

3. Hydrogen and chlorine react slowly in diffused sunlight to give hydrogen chloride.

A. True.

4. Hydrogen gas is highly soluble in water.

A. False; hydrogen is practically insoluble in water .

5. Hydrogen is non-combustible and non-supporter of combustion.

A. False; hydrogen is a combustible gas but a non-supporter of combustion.

Q16) Pure hydrogen burns in pure oxygen with a flame and it forms droplets of colourless liquid 'A' .

(i) what is the colour of the flame ?

A. Pale blue flame

(ii) identify 'A'.

A. Water

Q17) What is the purpose of oxyhydrogen flame?

A. It is used for welding and cutting of metals.

Q18) Metallic hydrides react with water to produce alkaline solution 'A' and gas 'B'. In this content, answer the following question.

(i) Identify 'A' and 'B' .

A. A=metallic hydroxide
B=hydrogen

(ii). What is the effect of adding neutral litmus solution 'A' ?

A. It turns blue.

(iii). What do you observe when burning splinter comes in contact with gas 'B'?

A. The splinter extinguishes and gas burns with a popping sound .

Q19) Write balanced chemical equations only for the reaction of hydrogen with:

(i) Oxygen

$2H_2 + O_2 \longrightarrow 2H_2O$

(ii). Sulphur

$H_2 + S \longrightarrow H_2S$

(iii). Chlorine

$H_2 + Cl_2 \longrightarrow 2HCl$

(iv). Copper oxide

$CuO + H_2 \longrightarrow Cu + H_2O$

(v). Ethene

$C_2H_4 + H_2 \longrightarrow C_2H_6$

CHAPTER -7, STUDY OF GAS LAWS

Q1) Name the following -

1) The state of matter which exerts pressure in all walls of the container ---> gaseous state

2) The factors over which gas laws are based ---> volume, temperature, pressure

3) The temperature at which the kinetic energy of a solid is treated to be zero ---> zero Kelvin

4) The law in which volume of a fixed mass of a dry gas is related to pressure when temperature is constant ---> Boyle's law

5) The law in which the volume of a fixed mass of a dry gas is related to absolute temperature when pressure is constant ---> Charle's law

Q2) Write one point of difference between Celsius scale and absolute scale-

Celsius Scale	**Absolute Scale**
1) The scale has both positive and negative figures.	1) The scale has only positive figures.

Q3) Numericals -

1) A gas occupies the initial volume of 400cm^3 at a pressure P. If the pressure is changed to 5 atmospheres, the volume of the gas becomes 200cm^3. Claculate the final pressure.

Ans - $P_1 = P$ $V_1 = 400cm^3$

$P_2 = 5$ atmospheres $V_2 = 200cm^3$

$P_1V_1 = P_2V_2$

$\Rightarrow P_1 = \frac{5 \times 200}{400}$

So, $P_1 = 2.5$ atmospheres

2) To what temperature must chlorine gas at 132^0 C be cooled in order to reduce its volume to one-fifth of its original volume?

Ans - $V_1 = V$ $V_2 = V/5$

$T_1 = 132^0C = 132 + 273$ $T_2 = ?$

$= 405$ K

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\Rightarrow T_2 = \frac{V \times 405}{5 \times V} = 81$ K

So, $T_2 = 81 - 273 = -192\ ^0C$

3) At a given temperature, the pressure of the gas reduces to 75% and its volume is increased by 40%. Calculate its final temperature if its initial temperature is -10^0C ?

Ans - $P_1 = P$ $P_2 = 75/100 \times P = 3P / 4$

$V_1 = V$ $V_2 = V + 40V / 100 = 140V / 100 = 7V/5$

$T_1 = 273 - 10 = 263$ K $T_2 = ?$

$P_1V_1/T_1 = P_2V_2/T_2$

$\Rightarrow T_2 = \frac{P_2V_2T_1}{P_1V_1}$

$\Rightarrow T_2 = \frac{3P \times 7V \times 263}{4 \times 5 \times P \times V}$

$= 5523 / 20 = 276.15$ K

Q4) What are all gases made up of?

Ans. All gases are made up of large number of extremely small particles called molecules.

Q5) Can some gases be composed of atoms only?

Ans. Yes, some gases are composed of atoms only. These gases are known as monoatomic gases. They include inert gases like Helium, Neon, Argon, Krypton, etc.

Q6) Why there is no effect of gravity on the motion of the molecules of a gas?

Ans. There is no effect of gravity on the motion of the molecules of a gas because of negligible mass and high kinetic energy of the gas molecules.

Q7) Write one word for the following.

1- Measure of average kinetic energy possessed by the gas molecules.

2- Spaces occupied by a gas.

3- Movement of one gas molecule into another gas.

4- Coming closer to molecules of a gas.

5- When molecules strike against each other.

Ans. 1- Temperature

2- Volume

3- Diffusion

4- Compression

5- Collisions

Q8) Fill in the blanks with suitable words.

1- All gases are made up of large number of ……

2- There are …… forces between the molecules.

3- There are large vacant spaces between the molecules known as ……

4- There is no effect of …… on the motion of the molecules of a gas.

5- Gases can occupy whole ..... available to them.

Ans. 1- Molecules

2- intermolecular

3- intermolecular spaces

4- gravity

5- space

Q9) Write the temperature.

1- 10°C on Kelvin scale.

2- 87 K on Celsius scale.

3- 58°C into Kelvin scale.

Ans. 1- 283 K

2- -186°C

3- 331 K

Q10) 100 cm^3 of a gas at 27◦C is cooled at 20◦C at constant pressure. Calculate the volume of gas at 20◦C

Sol. V_1=100cm^3

V_2= ?

T_1= 27+273=300K

T_2= 20+273=293K

$\frac{V_1}{T_1}=\frac{V_2}{T_2}$

$V_2=\frac{100\times293}{300}$=97.67 cm^3

Q11) The volume of certain gas was found 400 cm^3, when pressure was 520 mm Hg. If the pressure Is increased by 30%, find the new volume of the gas.

Sol. V_1= 400cm^3

P_1= 520 mm Hg

30% of P_1= $\frac{520\times 30}{100}$=156 mmHg

P_2= 156+520 =676mmHg

V_2= ?

$P_1V_1 = P_2V_2$

V_2= $\frac{520\times400}{676}$ = 307.69 cm^3

Q12) Carbon dioxide occupies a volume of 336 cm3 at S.T.P. Find its volume at 20◦C and at a pressure Of 700 mmHg.

.P1 =760mmHg

P2 =700 mmHg

V1 = 336 cm3

T1 =273 K

V2 =?

T2 = 20+ 273=293 K

$\frac{P1V1}{T1} = \frac{P2V2}{T2}$

V2 =$\frac{760\times336\times293}{273\times700}$=391.52 cm3

Q13) Give reasons:

1. Gases are highly compressible.

Ans. In the case of gases, the molecules are far apart from each other .Therefore

The intermolecular space is maximum and thus gases can be compressed.

2. Pressure cookers are widely used in hilly areas:

Ans. As on higher altitudes or in hilly areas , the pressure decreases. So the boiling point

Of the liquid decreases. Therefore pressure cookers are widely used in hilly areas.

3. Gases exert pressure in all directions.

Ans. The molecules of gases move randomly in all possible directions, thus exerting

pressure. As pressure is defined as force per unit area , pressure of a gas or its impact

Can be recorded on the walls of container per unit area.

Q14) Account how temperature and molecular motion are inter- related ?

Ans. As the temperature increases the molecules gain kinetic energy and start moving faster.

CHAPTER - 8, ATMOSPHERIC POLLUTION

Q1) Name the following -

1) the oxides of sulphur treated as pollutants ---> sulphur dioxide
2) The acids present in acid rain ---> sulphuric , sulphurous , nitric , nitrous acid
3) The non-renewable fuel that can reduce pollution ---> wind energy / solar energy
4) The device which reduces the nitrogen emissions from an automobile ---> catalytic converter
5) Any two green-house gases as pollutants ---> carbon-dioxide , methane
6) The green-house gas which can retain the heat energy maximum ---> methane
7) A process through which methane enters into the air ---> bacterial decay
8) A process through which oxides of nitrogen enters into the air ---> anaerobic respiration
9) A device through which CFC enters into the air ---> coolant in ACs
10) The important gas responsible for the depletion of the ozone layer ---> chlorofluorocarbon

Q2) Write the balanced of the following equations -

1) S ---> SO_2 ---> SO_3 ---> H_2SO_4

Ans - S + O_2 ---> SO_2

$2SO_2 + O_2$ ---> $2SO_3$

$SO_3 + H_2O$ ---> H_2SO_4

2) O_3 ---> O_2 ---> O_3

Ans - O_3 $\xrightarrow{UV}$ O_2 + [O]

O_2 + [O] $\xrightarrow{UV}$ O_3

Q3) Give reasons -

1) The first shower of natural rainwater does not have a pH of 7

Ans - Natural rainwater contains dissolve carbon-dioxide or may be nitrogen-dioxide or may be sulphur dioxide or sulphur trioxide due to which it is acidic in nature. So the pH of water is less than 7

2) A catalytic converter in an internal combustion engine reduces pollution

Ans - A catalytic converter in an internal combustion engine reduces pollution as the converter separates the nitrogen atom from NO to NO_2 molecules freezing oxygen in the form of O_2 molecule. Thus the oxides of nitrogen which are pollutants are converted to free nitrogen.

---> Name the following questions may be asked in the form of definitions, fill in the blanks, match the following, MCQs etc.

Q4) ***With respect to acid rain, answer the following questions :***

(a) What do you mean by acid rain?

(b) Name the acids formed when acidic oxides dissolve in water.

(c) Which oxides are released by vehicular exhaust?

(d) Give chemical equations for the formation of following acids:

(i) carbonic acid

(ii) sulphurous acid

(iii) nitric acid

(iv) sulphuric acid

Ans.

(a) Acid rain is the rain which carries large amount of acid than normal.

(b) Carbonic acid, sulphurous acid, nitric acid, etc.

(c) Oxides of nitrogen are released by vehicular exhaust.

(d) (i) $CO_2 + H_2O \rightarrow H_2CO_3$

(carbonic acid)

(ii) $NO_2 + O_2 + 2H_2O \rightarrow 4HNO_3$

(nitric acid)

(iii) $SO_2 + H_2O \rightarrow H_2SO_3$

(sulphurous acid)

(iv) $SO_3 + H_2O \rightarrow H_2SO_4$

(sulphuric acid)

Q5) ***How are articles made-up of metals affected by acid rain ?***

Ans. Articles made-up of metals, gold and silver ornaments also slowly lose their lustre because of the acids present in the rain.

Q6) ***What is the effect of acid rain on the forest growth?***

Ans. The acid rain also damages leaves of plants and retard the growth of forests. The forest deterioration has already taken place in the world because of acid rain.

Q7) ***Explain nutrient leaching.***

Ans. Nutrient leaching occurs when acid rain adds hydrogen to the soil which interacts chemically with the existing minerals. This displaces Ca, Mg and K from the soil particles and deprives trees of nutrition.

Q8) ***Cultivating land is treated with slaked lime after acid rain. Justify.***

Ans. Slaked lime is a base and hence if it is added to neutralise the effect of acid in cultivating land.

Q9) ***Give reasons for the following :***

(a) Taj Mahal is turning yellow.

Ans. Taj Mahal is turning yellow due to the formation of calcium bisulphite which is yellow in colour.

$CaCO_3 + 2H_2O + 2SO_2 \rightarrow Ca(HSO_3)_2 + H_2O$

(b) Stone cancer is more prominent nowadays.

Ans. The statues and monuments made of calcium carbonate dissolve in acid rain to form calcium sulphate and calcium nitrate. Since these salts are water soluble, they are slowly washed away resulting in slow corrosion of these monuments and structures which is referred to as stone cancer.

(c) Nutrient leaching occurs in heavily polluted areas.

Ans. Heavily polluted areas contain more amount of acid. When the acid falls on soil it results in nutrient leaching which is a process that depletes calcium,magnesium, and potassium from soil particles and deprives trees of nutrients.

(d) Chlorofluorocarbons lead to depletion of ozone.

Ans. Chlorofluorocarbons are very light and reach the second layer of atmosphere. When CFCs reach the ozone layer, the UV rays break apart the CFC's and thus releasing the chlorine atom.

$Cl_2CF_2 \rightarrow Cl + CClF_2$

$Cl + O_3 \rightarrow ClO + O_2$

$ClO + O \rightarrow Cl + O_2$

Q10) ***Give:***

1. Two effects of ozone depletion.

Ans. (i) skin cancer

(ii) loss of sight

2. Two commonly used ozonisers are:

Ans. (i) Siemen'sozoniser

(ii) Brodiesozoniser

3. Two greenhouse gases.

Ans. (i) methane

(ii) carbon dioxide

4. Two ozone depleting substances.

Ans. (i) chlorofluorocarbons

(ii) nitrogen oxides

5. Two elements deprived from soil.

Ans. (i) calcium

(ii) potassium

Q11) ***Fill in the blanks with suitable words:***

1. Nutrient leaching **occurs when acid rain adds hydrogen ions to the soil which interacts chemicals with existing minerals.**

2. **The acids present in acid rain dissolves** heavy **metals such as Al, Mn, Pb, Zn.**

3. **Normal rain has pH between** 5.6 **and**6.0 .

4. **Natural pollution is caused by** volcanic eruptions, vegetable decay, forest fires, **etc.**

5. **Metals lose** lustre **because of acid present in rain.**

6. **Absence of greenhouse gases will result in decreasing the surface temperature to about** 15^{o}C.

7. Global **warming is due to accumulation of greenhouse gases.**

8. **Supersonic jets release oxides of** nitrogen **into the atmosphere.**

9. Methane **is released from degradable matter.**

10. Educating **the masses can save the dangers of global warming.**

11. **Ozone is present in the upper atmosphere about** 20 **km away from the surface of earth.**

12. **Ozone can be prepared by a** silent **electric discharge.**

13. **The** chlorine **atom reacts with ozone and converts it into simple oxygen.**

14. **High flying jets and rockets release** oxides of nitrogen.

15. **The bond angle is ozone is** 116.8^{o}.

Q12) ***Write one word answer for yhe following:***

1. Effect of ozone is maximum in= Australia.

2. A single atom of chlorine can destroy about = 10,000**atoms.**

3. Ozone blanket in the upper atmosphere is also known as = ozone layer.

4. An apparatus used for preparation of ozone = Seimen'sozoniser.

5. Ozone is separated from oxygen by = fractional distillation.

6. Substances which are replacing CFCs = HCFCs.

7. Any one disease caused due to ozone hole = skin cancer.

8. Type of electric discharge used in Seimen'sozoniser = silent electric discharge.

Q13) ***What are the ways of reducing greenhouse effect?***

Ans. (i) Aforestation : plant more trees.

(ii) Minimum use of automobiles: Use public transport.

(iii) Burning of fossil fuels should be minimized.

(iv) Deforestation should be stopped.

Q14) ***What is global warming? What is its cause? Also, write the effect of global warming?***

Ans. The rise in temperature of the earth's surface is called global warming. It is caused due to the trapping of sun's radiation by carbon dioxide in the atmosphere. This process is called greenhouse effect.

The various effects of global warming are:

(i) It will lead to the melting of glaciers and the polar ice caps which would lead to submerging of low lying coastal areas.

(ii) Global warming increases the water vapour in the atmosphere which will contribute further in increasing the temperature of the earth.

Q15) ***Why does rainwater have normally pH of about 5.6? When does it become acid rain?***

Ans. The rainwater is acidic (pH= 5.6) due to the dissolution of CO_2 in water vapours forming carbonic acid. The pH further decreases to 3-4.5 due to the dissolution of oxides of sulphur and nitrogen in water. The rain water with this low pH represents acid rain.

Q16) ***What would happen if the greenhouse gases were totally missing in the earth's atmosphere?***

Ans. The greenhouse gases absorb the solar energy which is radiated back from the earth's surface which helps increasing the temperature of the atmosphere near the earth's surface. As a result maintains a constant temperature on the earth's surface which supports life on earth. Thus, if there are no greenhouse gases, there would be no life on earth.

Q17) ***How does nitrogen dioxide enter in the atmosphere?***

Ans. At high temperature, in furnaces (>1500^oC), nitrogen combine with oxygen present in air and forms nitric oxides. This Nitric oxide combines with more oxygen present in air to form nitrogen dioxide.

$$N_2 + O_2 \rightarrow 2NO$$

$$2NO + O_2 \rightarrow 2NO_2$$

Q18) ***How is ozone formed in the atmosphere? Write the importance of ozone layer.***

Ans. Ozone is formed about 50 km above from the earth's surface (stratosphere) by the action of ultraviolet light on oxygen molecules.

$$3O_2 \rightarrow 2O_3$$

(Ozone)

Ozone shields most of the UV radiations and does not allow them to pass on the earth's surface.

Q19) ***How can we protect the ozone layer?***

Ans. Use of chlorofluorocarbons (CFCs) should be banned as they are widely used in refrigeration, industry, insecticides, kinds of sprays, etc