Grade 10 Chemistry Kerala 2019

SECTION- A

Q1. Which of the following molecule can undergo addition reaction?
(ethane, propene, butane, methane)

Solution:

Addition reaction is the type of chemical reaction in which an atom or a group of atoms is added to a molecule. Among the given molecules, the propene has a double bond, addition reaction is possible in it.

Q2. The glass used to make lens and prisms is -

Solution:

The flint glass is an optical glass which has a relatively high refractive index and that is why it is used to make lens and prisms.

Q3. Atomic mass of Nitrogen is 14. Which of the following sample contain 6.022×10^{23} Nitrogen atoms?
(7 g Nitrogen, 28 g Nitrogen, 14 g Nitrogen, 1 g Nitrogen)

Solution:

14 g Nitrogen contains 6.022×10^{23} Nitrogen atoms.
14 g N $=$ 1 GAM Nitrogen $= 6.022 \times 10^{23}$ nitrogen atoms = 1 mole of nitrogen atom.

Q4. The ore of a metal is lighter than the impurities. Which method is suitable for its concentration?

Solution:

The froth floatation method is used for its concentration ore of a metal which are lighter than the impurities present with the metal.

Q5. A fresh piece of Mg ribbon loses its luster after a few days. This is due to the formation of the compound?

Solution:

A fresh piece of Mg metal ribbon loses its luster after a few days due to the formation of the compound Magnesium Oxide (MgO) on its outer surface.

Section-B

(Answer any 4 questions from 6 to 10. Each question carries 2 marks)

Q6. The last subshell of an element is $3p$ and there are 3 electrons in it.

(a) Write the complete electronic configuration of the element

(b) Identify its period and group

Solution:

(a) Complete electronic configuration of the element phosphorous is as below, $1s^2 2s^2 2p^6 3s^2 3p^3$.

(b) Phosphorous element is present in the period – 3 and Group – 15.

Q7. An iron nail is dipped in $CuSO_4$ Solution. (Reactivity order Fe $>$ Cu)

(a) What is the change that can be noticed on the iron nail after a while?

(b) Write down the chemical equation of the oxidation reaction occurs here?

Solution:

(a) As per the reactivity series, iron element is more reactive than copper hence, the displacement reaction is possible between iron and the copper sulphate solution.

Chemical reaction equation is as below,

$$Fe + CuSO_4(aq) \rightarrow FeSO_4 + Cu$$

$$\text{Iron} + \text{Copper Sulphate (aq)} \rightarrow \text{Iron sulphate + copper}$$

The blue colour of the copper sulfate solution transitions into the pale green tint of iron sulfate as a result of displacement reaction. Also, the original silver shade of the iron nail changes to a reddish-brown colour due to the deposition of copper metal onto the nail.

(b) Chemical reaction equation of the oxidation reaction is given below:

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

Q8. 4 g of NaOH is dissolved in water and the volume is made up to 1 L .

(1 mole of NaOH $= 40$ g)

(a) Calculate the molarity of the resultant solution.

(b) How will you make 1 M solution of NaOH using the same amount (4 g) of NaOH ?

Solution:

(a) Molarity i.e. M is calculated as equal to n/V

Hence, number of moles, $n = 4/40 = 0.1$

$\therefore M = 0.1/1 = 0.1$ M

Thus, the molarity of the resultant solution is 0.1 M

(b) Hence, 1 M solution of NaOH can be prepared by dissolving 4 g of NaOH in 100 ml of water.

Q9. Concentrated Cu_2S is converted into oxide by roasting

(a) Write the process of roasting

(b) How impurities like sulphur and phosphorous are removed in this process?

Solution:

(a) Roasting process involves heating of a concentrated ore with an abundance of air at a temperature below its melting point.

(b) During roasting process, impurities such as sulfur and phosphorus are eliminated in the form of their oxides. In roasting, sulfides are transformed into oxides, releasing sulfur in the form of a gas, sulfur dioxide.

$2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$.

$4P + 5O_2 \longrightarrow 2P_2O_5 \uparrow$

Phosphorus Oxygen Phosphorus pentoxide

Q10. Ethanoic Acid is an organic compound having industrial values

(a) How ethanoic acid is manufactured industrially?

(b) Give any one use of ethanoic acid

Solution:

(a) Ethanoic acid is prepared industrially by the treatment of methanol with carbon monoxide in the presence of a suitable catalyst.

$$CH_3 - OH + CO \xrightarrow{\text{Catalyst}} CH_3 - COOH$$

(b) Ethanoic acid has various type of usages across various industries. Commercially, it is mostly used in the production of esters, vinegar, numerous polymeric materials, and serves as a solvent in the manufacturing of camphor, ascent, and as a cooking ingredient.

Section-C

(Answer any 4 questions from 11 to 15. Each Question Carries 3 Marks)

Q11. $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

(a) What is the total number of moles of reactants and products in the above reaction?

(b) What is the effect of pressure in this reversible reaction? Explain.

Solution:

(a) The No. of moles of reactants -> 2 moles of hydrogen & 2 moles of iodine.

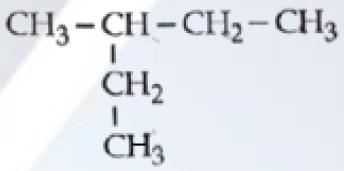
No. of moles of product -> 2 moles of Hydrogen iodide.

(b) The position of a reaction of two gases is affected by pressure if the number of molecules of the reactants is different from the number of molecules that are present in the product side. According to the Le Chatelier's principle, if the pressure is increased, the equilibrium shifts towards the side that has fewer molecules which eventually reduces the pressure, and vice versa.

$$H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$$

Hence, in the reaction given above, two different molecules on one side reactant to form two molecules of the product, so there is no effect of pressure in this reversible reaction.

Q12. The structure of hydrocarbon in given below:



(a)How many C - atoms are there in the main chain? Which is the word root?
(b) Identify the branch and its position number?
(c) Write the IUPAC name of this compound

Solution:

(a) There are 5 Carbon atoms in the main chain and the root word in the structure given above of hydrocarbon is Pent.
(b) The structure has Methane branch and its position number is 3.
(c) The IUPAC name of the above given compound is 3-methyl pentane.

Q13. The chemical equation for the manufacture of ammonia is

$$N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$$

(a) Complete the following:

$$1 \text{ mol } N_2 + \cdots \ldots . H_2 \rightarrow \cdots \ldots NH_3$$

(b) Calculate the amount of H_2 required to react with **28g** of $\mathbf{N_2}$ completely.
[Molecular mass of $N_2 = 28, H_2 = 2$]
(c) What will be the volume of NH_3 formed at STP, if 22.4 L of N_2 is completely reacted?

Solution:

(a) Complete reaction is, $1 \text{ mol } N_2 + 3 \text{ mol } H_2 \rightarrow 2 \text{ mol } NH_3$
(b) 28 g N_2 is equal to 1 mol of N_2 whereas, 1 mol of N_2 requires 3 mol of H_2.
Hence, the mass of $H_2 = 3 \times 2 \text{ g} = 6 \text{ g}$.
(c) As, 22.4 L N_2 is equal to 1 mol of N_2.
1 mol N_2 undergoes the reaction to produce 2 mol NH_3.
Therefore, the volume of NH_3 formed at STP $= 2 \times 22.4 = 44.8$ L

Q14. Consider the metals and solutions given in the box.

Zn, Mg, Cu, Ag, $CuSO_4$ Solution, $MgSO_4$ Solution.

(a) Which of the above metals have to be selected to construct a Galvanic Cell?

(b) Identify the anode and cathode of the cell.

[Reactivity order Mg > Zn > Cu > Ag]

(C) Write the redox reaction taking place in the cell.

Solution:

(a) Mg and Cu metals are selected among the given elements to construct a Galvanic Cell.

(b) Mg is the anode from the solution $MgSO_4$ and Cu is the Cathode from $CuSO_4$ solution.

(C) Redox reaction in the cell:

$Mg + Cu^{2+} \rightarrow Mg^{2+} + Cu$

Q15. Alumina is mixed with Cryolite and subjected to electrolysis to extract aluminium.

(a) Why Cryolite is added to alumina?

(b)Which are the ions present in the alumina?

(c)Write the equation of the reduction reaction taking place at negative electrode.

Solution:

(a) Aluminium oxide shows a very high melting point of more than 2000°C so melting metals at such high temperature gets very costly. So, additionally Cryolite is added to alumina to increase electrical conductivity and to reduce its melting point. This

decreases the cost that is involved in extracting aluminium.

(b) Cation is Al^{3+} and Anion is O^{2-}.

(c) Equation of the reduction reaction taking place at negative electrode i.e. cathode is,

$$Al^{3+} + 3e^{-} \longrightarrow Al \quad \text{(aluminium metal at the [(−) cathode]}$$

Section-D

Q16. Zinc piece and zinc powder are taken in two test tubes and equal amount of dil. HCl is added.

(a) In which test tube does the reaction proceed faster?

(b) Give reason.

(c) Give an instance in daily life, where such condition is made use.

Solution:

(a) If the same amount of dil. HCl is added in both test tubes then the test tube that consist of zinc powder will show faster reaction.

(b) When solid reactant molecules are broken into smaller pieces or powder form, they have a larger surface area. As the more reactant molecules come into contact and take part in collision eventually increasing the effective collisions numbers, as per the collision theory. Hence, the speed of the reaction also becomes faster.

(c) As for a daily life example, small pieces of firewood take less time to burn than the large pieces of firewood.

Q17. The structure of two organic compounds are given below:

(i) $CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}OH$

(ii) $CH_3\text{-}CH_2\text{-}O\text{-}CH_2\text{-}CH_3$

(a)Write the molecular formula of these compounds.

(b)Which type of isomerism do they exhibit?

(c)Explain the isomerism.

(d)Write the structural formula of a position of compound (i)

Solution:

(a) Molecular formula of these compounds are-

(i) $C_4H_{10}O$, Butanol

(ii) $C_4H_{10}O$, Ethoxyethane

(b) Both compounds Butanol and Ethoxyethane exhibit functional isomerism.

(c) Two or more compounds having the same molecular formula but they belong to the different functional groups are called functional isomers and this is termed as functional group isomerism. For example, the molecular formula $C_4H_{10}O$ represents both Butanol and Ethoxyethane.

(d)

Butan – 2 – ol

$CH_3-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_2-CH_3$ or $CH_3-CH_2-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_3$

Q18. The atomic number of an element is 19.

(a) Write the subshell electronic configuration.

(b)Identify its group, period, block and oxidation state.

(c) Write any one characteristic of the block to which the element belongs.

Solution:

(a) Subshell electronic configuration of the element is $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$.

(b) Element belongs to Group -1, Period- 4, Block-S, and its Oxidation State is $\pm$ 1.

(c) The element belongs to s-block and their characteristics are as-

i) Highly reactive metals.

ii) Have low melting and boiling points.

iii) Good conductors of heat and electricity.

iv) Form basic oxides.

Q19. Two organic reactions are given below:

(i)

(i) $H-\underset{\displaystyle H}{\underset{|}{\overset{\displaystyle H}{\overset{|}{C}}}}-Cl + Cl-Cl \longrightarrow \overset{A}{\cdots\cdots} + HCl$

(ii) $n\,CH_2=\underset{\displaystyle Cl}{\underset{|}{CH}} \longrightarrow \overset{B}{\cdots\cdots}$

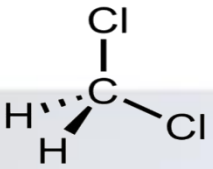
(a) Identify the products *A* and *B*

(b) Which type of reaction is (i)?

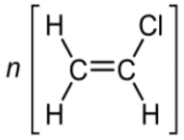
(c) The product B has industrial values. Give its name and use.

Solution:

Product A is A- CH_2Cl_2 or



Product B is $(C_2H_3Cl)_n$ or



(b) This is a substitution type of reaction.
(c) Product B i.e. Polyvinyl chloride is primarily used to manufacture pipes.

Q20. Aspirin is an antipyretic.

Amoxicillin is an antibiotic.

(a) Give the functions of antipyretic and antibiotic.
(b) Write any two unhealthy practices among people in using medicines.

Solution:

(a) Antipyretics are the medicines that are used to bring down the body temperature (while treating fever), whereas the antibiotics help to destroy the harmful microorganisms which cause diseases and prevent their growth.
(b)

- Self-medication.
- Not having the medicines as prescribed by the doctors.
- Overuse of medicines.
- Having medicines even after the prescribed periods.
- Taking the medicines that are prescribed for someone else.