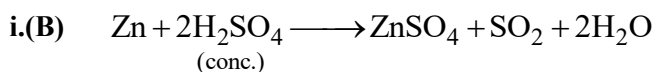


Solutions to ICSE SAMPLE PAPER | Class - X | Chemistry

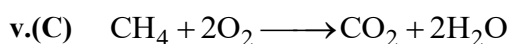
(SECTION – A)

Answer - 1

ii.(A) Fluorine has the highest electronegativity in periodic table & it belongs to 2nd period & 17th group.

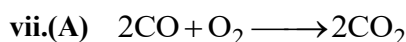
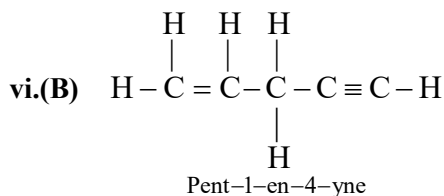
iii.(C) Butyric acid

iv.(A) Propane ($\text{H}_3\text{C}-\text{CH}_2-\text{CH}_3$) cannot exhibit chain isomerism.



$$\text{Moles of CO}_2 \text{ gas produced at STP} = \frac{179.2}{22.4} = 8$$

According to reaction, 1 mole CO_2 is produced from 1 mole of CH_4 . So, 8 moles CO_2 would be produced from 8 moles CH_4 .



By Gay-Lussac's law,

10L O_2 would require 20L CO to react but 30L CO is available.

∴ Limiting reagent – O_2

Now, 1 volume O_2 produces – 2 volumes CO_2

10 volume O_2 will produce – 20 volumes CO_2

∴ At the end of reaction, 10L CO & 20L CO_2 would be present while O_2 would be consumed up.

viii.(B) These are iso-electronic species (18e^- each). For such species, Ionic radius decreases as +ve charge increases & increases as –ve charge increases.

ix.(D) KCl (K^+ & Cl^-) is formed by an ionic bond; CH_4 & SO_2 contain only non-metals & are made up of covalent bonds.

NaOH is composed of Na^+ & OH^- ions & also comprises covalent bond between O and H atoms.

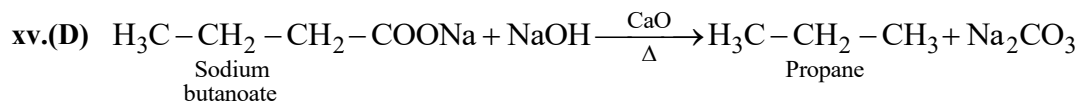
x.(C) According to octet rule, atoms combine to form molecules to complete octet, i.e. eight electrons in valence shell. But, B has only 6 electrons surrounding it in BF_3 .

xi.(A) In the electrolytic refining of copper, copper sulphate solution containing H_2SO_4 is used. A thin strip of pure copper is made the cathode & impure copper slab is made as anode. The insoluble impurities get collected below the anode as anode mud.

xii.(D) Cesium is an alkali metal.

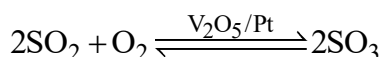
xiii.(A) Malachite	–	$\text{CuCO}_3 \cdot \text{Cu(OH)}_2$
Bauxite	–	$\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$
Corundum	–	Al_2O_3
Cryolite	–	Na_3AlF_6

xiv.(C) Aqua-regia is prepared by mixing three parts of concentrated hydrochloric acid & one part of concentrated nitric acid.

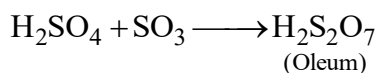


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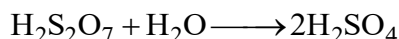
- i.** (a) Contact process
 (b) The process involves the oxidation of sulphur dioxide by air to SO_3 .



Sulphur trioxide is dissolved in 98% H_2SO_4 , forming oleum



The solution is then diluted with water to obtain concentrated sulphuric acid.



- (c) (A) It is used in the manufacture of fertilisers.
 (B) It is used as an electrolyte in lead storage batteries.
- ii.** (a) Colourless (b) Brown
 (c) Cadmium (d) Ca(OH)_2
 (e) Ionic
- iii.** (a) Lone pair (b) Limiting reagent
 (b) Electrolyte (d) Mercury
 (e) Flux
- iv.** (a)
$$\text{CaCO}_3 \xrightarrow{\Delta} \text{CaO} + \text{CO}_2 \uparrow$$

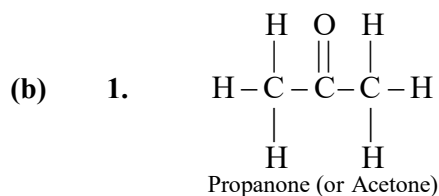
100g 56g 44g

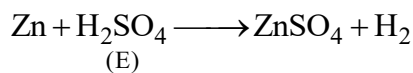
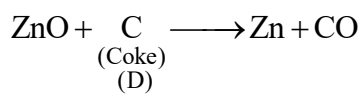
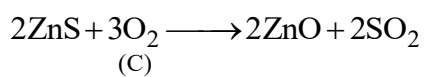
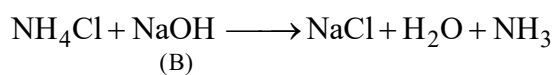
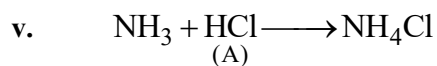
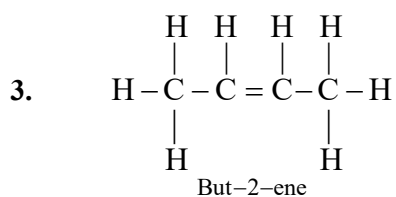
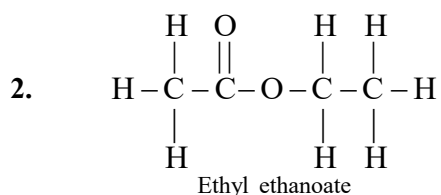
The solid residue is CaO. From the equation,

56 g CaO is produced from $\text{CaCO}_3 = 100 \text{ g}$

$$\therefore 14 \text{ g CaO is produced from } \text{CaCO}_3 = \frac{100}{56} \times 14 = 25 \text{ g}$$

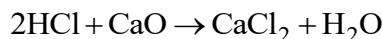
$$\therefore 'x' = 25 \text{ g}$$





(SECTION – B)

- Ans. 3 (i) (a)** HCl is acidic and quicklime (CaO) is basic in nature. So they undergo chemical reaction when brought together.



- (b)** Gas is highly soluble in water so cannot be collected over water. It is collected by downward displacement of air.

- (ii) (a)** Duralumin

- (b)** Stainless steel

- (iii)** $2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$

30 32 44 18 (Molecular mass in g/mol)

C_2H_6 : CO_2

2 : 4

1 : 2

No. of moles of CO_2 is twice that of C_2H_6

So volume will also be twice.

80 ml of ethane will produce $2 \times 80 = 160$ ml of CO_2

O_2 : C_2H_6

7 : 2

3.5 : 1

No of moles of oxygen is 3.5 times

So, the volume of oxygen will also be 3.5 times.

To burn 80 ml of ethane, $3.5 \times 80 = 280.0$ ml of oxygen is required

Remaining oxygen = $300 - 280 = 20$ ml

The resultant gaseous mixture is 160 ml of CO_2 and 20 ml of oxygen.

- (iv) (a)** $\text{Mg}_3\text{N}_2 + 6\text{H}_2\text{O} \rightarrow 3\text{Mg}(\text{OH})_2 + 2\text{NH}_3$

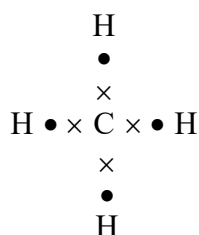
- (b)** As this is very expensive method.

- (c)** Bring a rod dipped in HCl near it. Dense white fumes of ammonium chloride is formed.

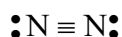
- Ans. 4. (i) (a)** **Molar volume** - Molar volume refers to the volume occupied by one mole of a substance under specific conditions of temperature and pressure.

- (b)** **Normal salt** - A normal salt is a term used to describe a salt that is formed when a base completely replaces replaceable hydrogen atoms in an acid molecule through a neutralisation reaction. They have no ionizable hydrogen atoms

- (ii) (a)** Methane molecule



- (b)** Nitrogen molecule



- (iii) (a) $\text{Al}_2\text{O}_3 + 2\text{NaOH} \rightarrow 2\text{NaAlO}_2 + \text{H}_2\text{O}$
 (b) $\text{C}_2\text{H}_5\text{COONa} + \text{NaOH} \rightarrow \text{Na}_2\text{CO}_3 + \text{C}_2\text{H}_6$
 (c) $\text{CH}_2\text{Br}-\text{CH}_2\text{Br} + 2\text{KOH} \xrightarrow{(\text{alc.})} \text{HC} \equiv \text{CH} + 2\text{KBr} + 2\text{H}_2\text{O}$

- (iv) (a) Ethanol ($\text{C}_2\text{H}_5\text{OH}$)
 (b) Ethanoic acid
 (c) Ethene

- Ans.5 (i) (a) **Electronegativity:** The tendency of an atom in a molecule to attract the shared pair of electrons towards itself is known as electronegativity.
 (b) **Gay Lussac's Law of combining volumes:** It states that, whenever the gases react, they always do so in volumes, which bear a simple whole number ratio to one another as well as to the gaseous products, if all volumes being measured under similar conditions of temperature and pressure.

- (ii) CHCl_2

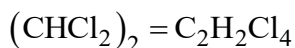
Molecular mass = $12 + 1 + 2 \times 35.5$

$$= 13 + 71.0 = 84.0$$

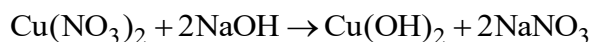
$n = \text{relative molecular mass/empirical formula mass}$

$$n = \frac{168}{84} = 2$$

molecular formula = (empirical formula) n



- (iii) (a) **Copper:** It does not show reaction with acids.
 (b) **Magnesium Sulphite:** $\text{MgSO}_3 + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2\text{O} + \text{SO}_2$
 (c) **Ferrous Sulphate:** It gives dirty green ppt with NaOH
 (iv) (a) Initially light blue ppt of $\text{Cu}(\text{OH})_2$ is formed along with sodium nitrate.



The ppt is soluble in excess NaOH solution giving a deep blue coloured solution.

- (b) White powder of magnesium oxide is formed.
 (c) Lead monoxide is reduced to grey coloured lead.

- Ans. 6. (i) (a) Tin
 (b) Iron
 (ii) (a) Sulphuric acid on reaction with barium chloride will give white precipitate whereas nitric acid will not give any precipitate on reaction with barium chloride.
 (b) Saturated hydrocarbons consist of only single covalent bonds between two carbon atoms while unsaturated hydrocarbons consist of at least one or more double or triple carbon-carbon bonds in the compounds.

- (iii) (a) Molar mass of $\text{CaCO}_3 = 100 \text{ g/mol}$
 Now, to find the mass of 5 moles of CaCO_3 , use the formula:
 Mass = Number of moles $\times$ Molar mass

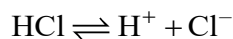
$$\text{Mass} = 5 \text{ mol} \times 100 \frac{\text{g}}{\text{mol}} = 500 \text{ g}$$
 Therefore, the mass of 5 moles of CaCO_3 is 500 grams.
- (b) According to the balanced equation, 1 mole of calcium carbonate (CaCO_3) reacts with 2 moles of hydrochloric acid (HCl).
 Therefore, if you have 5 moles of calcium carbonate, you would need $5 \text{ mol} \times 2 = 10$ moles of hydrochloric acid for a complete reaction.
- (c) According to the equation, 1 mole of calcium carbonate produces 1 mole of carbon dioxide (CO_2). Therefore, 5 moles of calcium carbonate would produce 5 moles of carbon dioxide.
 At STP, 1 mole of any gas occupies 22.4 liters.
 So, 5 moles of CO_2 occupy
 Mass = Number of moles $\times$ Molar volume at STP

$$\text{Mass} = 5 \text{ mol} \times 22.4 \text{ L} = 112.0 \text{ L}$$
- (iv) (a) Methane on complete combustion gives carbon dioxide gas and water.
 (b) Thermal decomposition of copper carbonate gives cupric oxide and carbon dioxide gas.
 (c) The chlorine gas is released when MnO_2 reacts with HCl.
- Ans.7 (i) (a) $\text{C}_2\text{H}_2 = 2 \times 12 + 2 \times 1 = 24 + 2 = 26 \text{ g}$
 $\text{C}_3\text{H}_4 = 36 + 4 = 40 \text{ g}$
 $\text{CH}_4 = 16 \text{ g}$
 $\text{C}_2\text{H}_4 = 28 \text{ g}$
 $\text{CH}_4 < \text{C}_2\text{H}_2 < \text{C}_2\text{H}_4 < \text{C}_3\text{H}_4$
- (b) $\text{Ag}^+ > \text{Cu}^{2+} > \text{Zn}^{2+} > \text{Na}^+$
 Elements at lower position get discharged easily.
- (ii) (a) **Cane sugar:** Results in the formation of black spongy mass of carbon known as sugar charcoal.
Copper sulphate: The blue crystal changes to white powder (anhydrous copper sulphate) due to dehydration.
- (b) The salts of sulphuric acid are sulphates (e.g., Na_2SO_4) and bisulphates (e.g., NaHSO_4) while the salts of hydrochloric acid contain Cl^- ions (e.g., NaCl).
- (iii) (a) $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$
 This is Ostwald's process to produce nitric oxide.
- (b)
$$\begin{array}{ccccccc} \text{H}_2\text{SO}_4 & + & 2\text{NaOH} & \rightarrow & \text{Na}_2\text{SO}_4 & + & 2\text{H}_2\text{O} \\ \text{(Sulphuric acid)} & & \text{(Sod. Hydroxide)} & & \text{(Sod. Sulfate)} & & \text{(Water)} \end{array}$$
- (c) $\text{FeS(s)} + 2\text{HCl(aq)} \rightarrow \text{FeCl}_2\text{(s)} + \text{H}_2\text{S(g)}$

- (iv) (a) NH_4Cl
- (b) PbO : It behaves both as acidic and basic oxide.
- (c) CCl_4 : It is formed due to covalent bonding.

Ans. 8. (i) (a) The ions are formed in molten state while in the solid state the ions are packed tightly together due to the electrostatic force between them. So, $\text{PbBr}_2 \rightleftharpoons \text{Pb}^{2+} + 2\text{Br}^-$ or reaction Y will show electrolytic dissociation.

- (b) The reaction X in the solution state gives an ionisation reaction.



- (ii) (a) Inert gas do not form ions because their outermost shell is completely filled and possess a stable configuration. So they are unreactive in nature and do not form ions.
- (b) The molecules that are formed by the covalent bonds are held together by weak intermolecular forces. Thus, a very small amount of energy is required to break the bonds between two or more molecules as a result they possess low melting and boiling points.

- (iii) (a) The decreasing order of their atomic size is as follow

Beryllium (Be) > Carbon (C) > Fluorine (F)

- (b) The increasing order of their replaceable hydrogen ions is as follow

Acetic acid (CH_3COOH) < Sulphuric acid (H_2SO_4) < Phosphoric acid (H_3PO_4)

- (c) The increasing order of their ionisation potential is as follows

Lithium (Li) < Boron (B) < Beryllium (Be)

- (iv) (a) Hydrogen (H)

- (b) Sulphur (S)

- (c) Chlorine (Cl)