Scholars Den Mock Test: Sure Success Recipe
ICSE Board Class 10 Chemistry Solution

1. A.(i) (b) Dehydration of ethanol with Al_2O_3 produces ethene.

$$\underset{\text{Ethanol}}{C_2H_5OH} \xrightarrow[\Delta]{Al_2O_3} \underset{\text{Ethene}}{C_2H_4}$$

(ii) (d) On moving top to bottom in a group, atomic size increases which makes Rb easier to change as unipositive cation.

(iii) (b) Most reactive metal oxides like aluminium, magnesium, potassium and calcium oxides are reduced by electrolysis.

(iv) (a) Salts are readily produced by the neutralisation reaction between acid and base.

(v) (d) Oxidising agent used in Ostwald's process is O_2 . Here O_2 oxidises ammonia (NH_3) to nitric acid (HNO_3).

B. (i) lose (ii) low (iii) Ester (iv) magnesium nitride (v) molecules

C. (i) $\underset{\text{Ethane}}{2C_2H_6} + 7O_2 \longrightarrow \underset{\text{Carbon dioxide}}{4CO_2} + 6H_2O$

(ii) $\underset{\text{Calcium carbonate}}{CaCO_3} + \underset{\text{Silicon dioxide}}{SiO_2} \longrightarrow \underset{\text{Calcium silicate}}{CaSiO_3} + \underset{\text{Carbon dioxide}}{CO_2\uparrow}$

(iii) $\underset{\text{Ammonia}}{2NH_3} + \underset{\text{Sulphuric acid}}{H_2SO_4} \longrightarrow \underset{\text{Ammonium sulphate}}{(NH_4)_2SO_4}$

(iv) $\underset{\text{Ferric oxide}}{Fe_2O_3} + \underset{\text{Aluminium}}{2Al} \longrightarrow \underset{\text{Iron}}{2Fe} + \underset{\text{Aluminium oxide}}{Al_2O_3}$

(v) $\underset{\text{Zinc nitrate}}{Zn(NO_3)_2} + \underset{\text{Sodium hydroxide}}{2NaOH} \longrightarrow \underset{\text{Zinc hydroxide}}{Zn(OH)_2\downarrow} + \underset{\text{Sodium nitrate}}{2NaNO_3}$

D. (i) When dil. HCl is added to methyl orange, colour of methyl orange changes from orange to pink.

(ii) When blue litmus paper is dipped in an aqueous solution of sodium bicarbonate, the colour of the blue litmus paper remains same. Since, pH value of baking soda($NaHCO_3$) is 8, which shows its basic nature.

(iii) A yellow precipitate of sulphur and a burning odour of SO_2 is obtained.

$$\underset{\text{Sodium thiosulphate}}{Na_2S_2O_3\,(aq)} + \underset{\text{Hydogen chloride}}{2HCl\,(g)} \longrightarrow \underset{\text{Sodium chloride}}{2NaCl\,(aq)} + H_2O\,(l) + \underset{\text{Sulphur dioxide}}{SO_2\,(g)} + \underset{\text{(Yellow)}}{S\downarrow}$$

(iv) A volatile nitric acid is formed.

$$\underset{\text{Potassium nitrate}}{KNO_3(s)} + \underset{\text{(Conc.)}}{H_2SO_4} \longrightarrow \underset{\text{Potassium bisulphate}}{KHSO_4(s)} + \underset{\text{Nitric acid}}{HNO_3(s)}$$

(v) Dark reddish brown fumes of bromine evolve at anode and greyish white metal lead is formed at cathode.

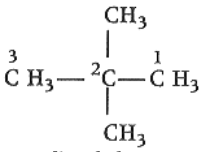
At cathode $Pb^{2+} + 2e^- \longrightarrow \underset{\text{Grey}}{Pb}$

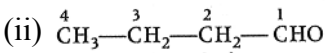
At anode $Br^- \longrightarrow \underset{\text{Reddish brown fumes}}{Br + e^-}$

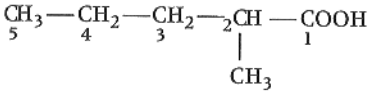
E. (i) Flux (ii) Conductor

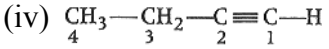
(iii) Aluminium hydroxide [$Al(OH)_3$] (iv) Electrolytic refining

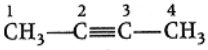
(v) Contact Process

F. (i) 
2, 2-dimethyl propane

(ii) 
Butan–1–al

(iii) 
2-methyl, pentan-1-oic acid

(iv) 
But-1-yne

(v) 
But–2–yne

G. (i) I. Molecular weight of nitrogen (N_2) =2×14

∴ Gram molecular weight of nitrogen =28 g

Mass of one molecules of nitrogen $=\frac{28}{6.022\times10^{23}}=4.65\times10^{-23}$ g

II. Number of oxygen atoms in 16 g of atomic oxygen =6.022×10^{23} atoms.

∴ Mass of one atom of oxygen $=\frac{16}{6.022\times10^{23}}=2.657\times10^{-23}$g

III. Number of hydrogen atoms in lg of atomic hydrogen =6.022×10^{23} atoms.

Mass of one atom of hydrogen $=\frac{1}{6.022\times10^{23}}=1.66\times10^{-22}$ g

(ii) The balanced chemical equation is

$$\underset{\substack{2\text{ moles}\\ 2\times22400\text{ cm}^3}}{2\,C_2H_2} + \underset{\substack{5\text{ moles}\\ 5\times22400\text{ cm}^3}}{5\,O_2} \longrightarrow 4\,CO_2 + \underset{\substack{4\text{ mol}\\ 4\times22400\text{ cm}^3}}{2\,H_2O}$$

∵ 2× 22400 cm^3 of acetylene require O_2 for complete combustion =5× 22400 cm^3

200 cm^3 of acetylene will require O_2 for complete combustion $=\frac{5\times22400}{2\times22400}\times200$= 500 cm^3 at STP

H. (i) Atomic size increases on moving down the group due to increase in the number of shells. Thus, the increasing order of atomic size is Li < Na < K.

(ii) The cations are discharged at cathode by gain of electrons. This tendency to gain electrons increases on moving from top to bottom in the series. Thus, the order of preference discharge at cathode is $Na^+<Mg^{2+}<Zn^{2+}<Cu^{2+}$

(iii) Metallic character is the tendency to lose the valence electrons to form cations. It increases down the group due to increase in atomic size and nuclear charge. The effect of an increased atomic size is greater as compared to the increased nuclear charge therefore, tendency to lose electron increases. Thus, the correct increasing order of metallic character is Li<Na<K < Rb< Cs.

(iv) On moving left to right in a period, nuclear pull increases as a result atomic size decreases. Thus, the correct decreasing order is Na> Mg > Si> S> Cl.

(v) Ionisation potential decreases down the group whereas increases across the period. Hence, the correct order of ionisation potential is B < Si < C < F.

2. A. (i) Platinum (ii) Al (iii) Calcination

B. (i) Carbon tetrachloride is non-polar covalent compound and water is a polar covalent compound. So, carbon tetrachloride does not dissolve in water.

(ii) Under normal conditions, an ionic compound exists in solid state. Thus, the compound QS will exist in solid state.

(iii) To form an ionic compound, if one element gives electrons then the other accepts electrons. Metals can only lose electrons and provide positive ions and non-metals accept electron and form negative ions. Therefore, both Q and S cannot be metal because they form ionic compound with each other. If Q is metal then S will be non-metal or vice-versa.

C. (i) Hydrogen chloride gas (HCl).

(ii) Gas Y i.e., HCl gas is highly soluble in water.

(iii) It is acidic in nature.

(iv) Ammonia gas.

3. A. (i) Sugar solution, being a covalent compound, does not conduct electricity as the ions are absent and only molecules are present.

(ii) On burning methane in insufficient supply of air it will produce carbon monoxide which is highly poisonous.

(iii) Hydrocarbons are inflammable which produce large amount of heat during combustion. They have also high calorific values due to high percentage of carbon, so they are excellent fuels.

B. (i) 1 mole of C_2H_6 contains 2 moles of carbon atoms.

$\therefore$ 3 moles of C_2H_6 will contain C-atoms $=2\times3=6$ mol

(ii) 1 mole of C_2H_6 contains 6 moles of hydrogen atoms.

$\therefore$ 3 moles of C_2H_6 will contain H-atoms $= 6\times3=18$ mol

(iii) 1 mole of C_2H_6 contains Avogadro's number 6.02×10^{23} molecules.

$\therefore$ 3 moles of C_2H_6 will contain ethane molecules $= 3\times6.02\times10^{23} = 18.06\times10^{23}$ molecules

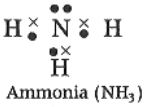
C. (i) $\underset{\text{Ethyl chloride}}{C_2H_5Cl} + KOH(alc.) \longrightarrow \underset{\text{Ethene}}{C_2H_4} + KCl + H_2O$

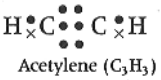
(ii) $\underset{\text{Ethene}}{C_2H_4} + H_2O \xrightarrow{H^+} \underset{\text{Ethanol}}{C_2H_5OH}$

(iii) $\underset{\text{Ethyl alcohol}}{C_2H_5OH} + \underset{\text{Acetic acid}}{CH_3COOH} \xrightarrow{\text{Conc } H_2SO_4} \underset{\text{Ethyl acetate}}{CH_3COOC_2H_5} + H_2O$

(iv) $2Al(OH)_3 \xrightarrow{1100^0C} \underset{\text{alumina}}{\text{Pure } Al_2O_3} + 3H_2O\ (\text{Vapours})$

4. A. (i) Calcination (ii) Oxalic acid (iii) Vanadium pentaoxide (V_2O_5)

B. (i) I.  Ammonia (NH_3)

II.  Acetylene (C_3H_3)

(ii) HCl gas cannot be dried over quicklime because it reacts with quicklime to form a salt.

C. (i) Sulphuric acid (ii) Nitric acid (iii) Hydrochloric gas (iv) Acetic acid

5. A. (i) 7.9 mg of Ca $= 7.9\times10^{-3}$ g of Ca

$\because$ 40 g of Ca = 1 mole of Ca

So, 7.9×10^{-3}g of Ca $= \frac{1}{40}\times7.9\times10^{-3} = 1.975\times10^{-3}$ mole of Ca

(ii) 65.5 µg of C=65.5×10^{-6} g of C = $\frac{65.5\times10^{-6}}{12}$ mol = 5.458×10^{-6} mole of C

(iii) 1 mole of O_2 molecules = 6.022×10^{23} molecules

6.022×10^{23} molecules =1 mole of oxygen molecules

B. (i) Electronegativity decreases from Li to Cs, i.e., group I elements, because there is an increase in atomic number down a group, i.e. nuclear charge increases, but due to addition of extra shells, the atomic size increases. The effect of an increase in the atomic size overcomes the effect of an increase in the nuclear charge hence, electronegativity decreases down a group.

(ii) Electron affinity increases from left to right in a period. Because the atomic size decreases and the nuclear charge increases, so the electron affinity increases.

(iii) Metallic character decreases along a period from left to right as the size decreases. Hence, elements cannot lose electrons easily.

C. (i)

Lead salt Pb^{2+}	Zinc salt Zn^{2+}
When ammonium hydroxide solution is added, a chalky white precipitate is formed which is insoluble in excess of ammonium hydroxide.	A white precipitate is formed when anmonium hydroxide is added drop by drop and this precipitate solubilise in excess of ammonium hydroxide

(ii)

Iron (II) sulphate	Iron (III) sulphate
When ammonium hydroxide solution is added, a dirty green precipitate is formed which turns reddish brown after sometime and is insoluble in excess of ammonium hydroxide.	In this case, a reddish brown precipitate is formed, which is also insolube in excess of ammonium hydroxide solution.

6. A. (i) I. Germanium II. Caesium III. Iodine IV Radon

(ii) Carbon rods

B. (i) Solder, alloy of lead and tin. Tin lowers melting point of alloy, it melts at 180° C. It is useful for making electrical connections.

(ii) At cathode

(iii) Sulphide ores like zinc blende (ZnS) and galena (PbS) are higher than the impurities present. They are concentrated by froth flotation process.

C. (i) Acetylene contains triple bonded carbon atoms, and hence, easily undergoes addition reactions. Thus, acetylene is more reactive than ethane.

(ii) In ethene, double bond breaks easily and thus, it provides site for addition reaction. While, in methane, carbon is bonded with 4 H-atoms with single bonds which cannot break easily and does not undergo addition reaction.

7. A. (i) Oxygen present in air = $\frac{20}{100}\times1000 = 200$ cm^3

$$\underset{1\text{ vol}}{C_3H_8} + \underset{5\text{ vol}}{5O_2} \longrightarrow 3CO_2 + 4H_2O$$

5 vol of O_2 is required for 1 vol of C_3H_8.

$\therefore$ 200 cm^3 of O_2 is required = $\frac{200}{5}$ cm^3 of C_3H_8=40 cm^3 of C_3H_8

(ii) The mass of 22.4 L of a gas at STP is equal to its gram molecular mass.

11.2L of gas at STP weight =24g

$\therefore$ 22.4 L of gas will weight = $\frac{24}{11.2}\times 22.4 = 28$ g

B.

	Electrolyte	Cathode	Anode
Silver plating of a spoon	Solution of potassium argentocyanide	Spoon	Pure silver
Purification of copper	Copper sulphate solution	Pure strip of copper	Impure block of copper

C. (i) $\underset{\text{Magnesium chloride}}{MgCl_2} + \underset{\text{Sulphuric acid}}{H_2SO_4} \longrightarrow \underset{\text{Magnesium sulphate}}{MgSO_4} + \underset{\text{Hydrogen chloride}}{2HCl}\uparrow$

(ii) $\underset{\text{Calcium oxide}}{CaO} + 2HCl \longrightarrow \underset{\text{Calcium chloride}}{CaCl_2} + H_2O$

(iii) $\underset{\text{Iron}}{Fe} + 2HCl \longrightarrow \underset{\text{Ferrous chloride}}{FeCl_2} + H_2\uparrow$

(iv) $\underset{\text{Lead oxide}}{Pb_3O_4} + \underset{\text{Hydrochloric acid}}{8HCl} \longrightarrow \underset{\text{Lead chloride}}{3PbCl_2} + 4H_2O + \underset{\text{Chlorine}}{Cl_2}\uparrow$