CHEMISTRY III 2006

SECTION A

ANSWER 001

(a) $CuO + H_2 \rightarrow Cu + H_2O$

(b) CuO

(c) Copper II Sulphate

ANSWER 002

(a) $NH_{3(aq)}$

(b) $AgNO_{3(aq)}$

(c) $H_2SO_{4(aq)}$

(d) H_2SO_4

ANSWER 003

(a) Hydrocarbon is a substance which contains carbon and hydrogen only.

(b) $C_{10}H_{16}$

(c) The colour would change from redish brown to colourless

(d) Double bond.

ANSWER 004

(a) Hard water is that water that does not form lather readily with soap.

(b) Permanent hardness is caused by the dissolved compounds i.e $CaSO_4$, $MgSO_4$ but temporary hardness is caused by dissolved compounds like calcium bicarbonate or magnesium bicarbonate

Permanent hardness can be removed by chemical means only but temporary hardness can be removed by physical means i.e boiling water.

(c) $Ca(HC0_3)_2$ aq $\xrightarrow{\Delta}$ $CaO_{3(s)} + C0_{2(s)} + H_2O_{(l)}$

ANSWER 005

(a) Mg : 2,8,2

(b) Electrovalent / Ionic

(c) Mg_3N_2

ANSWER 006

(a) In solid state, there are no free ions, but in molten state, there are free ions responsible for electric current flow.

(b) $Na^+ + e \rightarrow Na$

$2Cl^- - 2e \rightarrow Cl_2$

ANSWER 007

(a) Zn^{2+}

(b) SO_4^{2-}

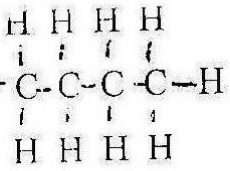
(c) No Cl- ion is present

(d) Amphoteric

ANSWER 008

(a) Butane

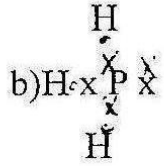
(b) (i)



i)

ANSWER 009

(a) Covalent bond

b) 

ANSWER 010

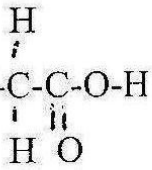
(a) Fractional distillation.

(b) Chromatography.

(c) Simple distillation.

(d) Filtration .

ANSWER 011

(a) 

(b) A gas which turns line water milky.

(c) An ester.

ANSWER 012

(a) Presence of : (i) Moisture /water.

(ii) Air (O_2)

(b) both use oxygen to take place.

ANSWER 013

(a) **A polymer** is a large molecule built from hundreds or thousands of small unit molecules called monomers joined together.

(b) Unsaturated hydrocarbon are hydrocarbons which contain less than the maximum amount of hydrogen atoms due to having double or triple bond and so react addition reaction .

(c) Poly (ethene) is used to in the manufacture of polythene bags.

ANSWER 014

$2Al(s) + 3cl_{2(g)} \rightarrow 2AlCl_{3(s)}$

From the equation :

2 moles of Al $\rightarrow$ 2 moles of $AlCl_3$

Rmm of $AlCl_3 = 27 + 35.5 \times 3 = 133.5$

$\Rightarrow$ (2x27) g of Al $\rightarrow$ 2 x 133.5g of $AlCl_3$

1g of Al $\rightarrow \frac{2 \times 133.5}{2 \times 27}$

0.54g of Al $\rightarrow \frac{133.5}{27} \times 0.54 = 2.67$g of $AlCl_3$

$= 720cm^3$ of Cl_2 at f.t.p

ANSWER 015

(a) It reacts with oxyhaemoglobin forming carboxyhaemoglobin which cant release oxygen for oxidation hence a person may die of oxygen starvation.

(b) $2C + O_2 \rightarrow 2CO$

(c) Well – ventilated room provides sufficient supply of oxygen

SECTION B

ANSWER 016

(a) (i) $2NH_4Cl + Ca(OH)_2 \rightarrow CaCl_2 + 2NH_3 + 2H_2O$

(ii) Sublimation is the change of state from solid directly to gas or vice-versa.

(iii) Rmm of $NH_4Cl = 14 + 1 \times 4 + 35.5 = 53.5$

$$\% \text{ Nitrogen} = \frac{14}{53.5} \times 100 = 26.2\%$$

b) (i) By Fractional distillation of liquid air

(ii) 450 – 500°C , catalyst, divided iron

(iii) Ammonia is used in the manufacture of artificial fertilizers .

ANSWER 017

(a) Oxidation.

(b) $CH_3COOC_2H_5$, Ethl ethanoate.

(c) Dehydration of ethanol.

Reagent : conc H_2SO_4

(d) Ethyl chloride , C_2H_5Cl.

(e) Sodium ethanoate.

(f) $2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONA + CO_2 + H_2O$.

(g) Spirit .

ANSWER 018

(a) Allotropy

(b) (i) **Graphite** crystals consist of layers of carbon atoms, and each carbon atom is joined to others by covalent bonds.

Diamond has tetrahedral structure in which each carbon atom is joined to four others by strong covalent bonds .

ii) Graphite contains delocalized (free and mobile) electrons which responsible for graphite to conduct electric current .

Diamond has no delocalized electrons .

(c) Uses of diamond

1. Used for drilling and cutting hard cutter substances e.g used as glass .
2. Used for making rungs and ear rings .

ANSWER 019

(a) $CaO + H_2O \rightarrow Ca(OH)_2$

(b) (i) Number of moles of nitric acid = $\frac{0.05 \times 7.5}{1000}$

$= 3.75 \times 10^{-4}$

(ii) From the equation :

1 moles of HNO_3 react with 1 mole of $Ca(OH)_2$

1 Mole of $HN0_3$ reacts with $\frac{1}{2} \times 3.75 \times 10^{-4}$

$= 1.875 \times 10^{-4}$

(iii) Number of moles of $Ca(OH)_2$ = Number of moles of CaO

Number of moles of $CaO = 1.875 \times 10^{-4}$

But mass = Number of moles x *Rmm*

Rmm of CaO = 40 + 16 = 56

Mass of CaO= 1.875 x 10-4 x 56 = 1.05×10^{-2}g

(c) $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

When more CO_2 is passed through, the white precipitate dissolves to give a colourless solution which is calcium bicarbonate

i.e $CaCO_3 + H_2O + CO_2 \rightarrow Ca(HCO_3)_{2(aq)}$

Colourless solution

ANSWER 020

(a) To reduce the melting point of Aluminium oxide

(b) At catrode

$2Al^{3+} + 6\bar{e} \rightarrow$ 2

(c) Since they are carbon. they react with oxygen produced forming CO_2 gas .

(d) – Soil erosion

- Air pollution (CO_2 from oxidation of carbon anode)

(e) Used in manufacture of air craft since it is the lightest metal.

SECTION C

ANSWER 021

(a) (i) Schemas

(ii) It acts as a catalyst

b) (i) Acidic , $SO_2 + H_2O \rightarrow H2SO_3$

(ii) Alkaline, $Na_2O + H_2O \rightarrow 2NaOH$

(iii) Acidic , $CO_2 + H_2O \rightarrow H_2CO_3$

c) Oxygen is used for respiration in living organisms.

Liquid oxygen is used as fuel for space rockets .

d) - Oiling.

- Painting .

ANSWER 022

a) (i) Acid : HCl

Metal : Mg

ii) Acid : HNO_3

[illegible]ace : PbO

iii) Acid : H_3COOH

Substance NaOH

b) (i) $ZnCO_3 + H_2SO_4 \rightarrow ZnSO_4 + CO_2 + H_2O$

(ii) To ensure that all the acid was used up.

(iii) Lead II sulphate is insoluble

(iv) By heating first zinc crystals and condense the vapour produced

Add the condensed vapour to anlydrous copper II Sulphate.

If copper II sulphate turns bleu , then the condensed vapour is water.

(v) First find Rmm of $ZnSO_4.7H_2O$

[illegible]

% of water = $\frac{126}{287} \times 100 = 43.9\%$