MARKING SCHEME
CHEMISTRY 233/2
END OF TERM ONE YEAR 2016.

1. a) Sublimation. ✓½

(b) (i) Put the mixture of sunflower, common salt and solid red dye in ethanol. Sunflower and common salt are insoluble, solid red dye dissolves, filter. ✓½ ✓½

(ii) Add water to the mixture of common salt and sunflower flow. Common salt will dissolve sunflower will not ✓½ Filter. ✓½

(iii) Crystallize the filtrate of common salt and solid-red dye is ethanol ✓①.

c (i) ~~Oxidising power~~ Element W has ① smaller radius than that of X. The electron affinity of W is higher than that of X ✓①

(ii) The melting point of T is higher ① than R. ~~A~~toms of T are bonded by strong covalent, atoms of R are bonded by metallic bond, not as strong as covalent bond. ①

(iii) Q.

(iv) N.

d (i)

Element	Compound
Iodine ✓½	Water ✓½
Diamond ✓½	Candle wax. ✓½

(ii) Make of drilling machine. ✓ (1 mk),
- Making of jewellery and necklaces.

2 (a) Pass through the air through filter, to remove dust particles/smoke particles or through a selective precipitator ½.

(b) The remaining gases mixture (consist) of N_2, O_2 and CO_2 and traces of noble gases. Pass the mixture through NaOH(aq) or KOH(aq) solution, to absorb CO_2 ½.

(c) N_2, O_2 and traces of noble gases are passed through fractional distillation of liquid air). Due to difference in B.P ~~Oxygen~~ O_2, N_2 and noble gases are separated ½.

(b) (i) Sulphuric (VI) acid (1mk)

(ii) $H_2SO_4(l) + SO_3(g) \rightarrow H_2S_2O_7(l)$ (1mk)

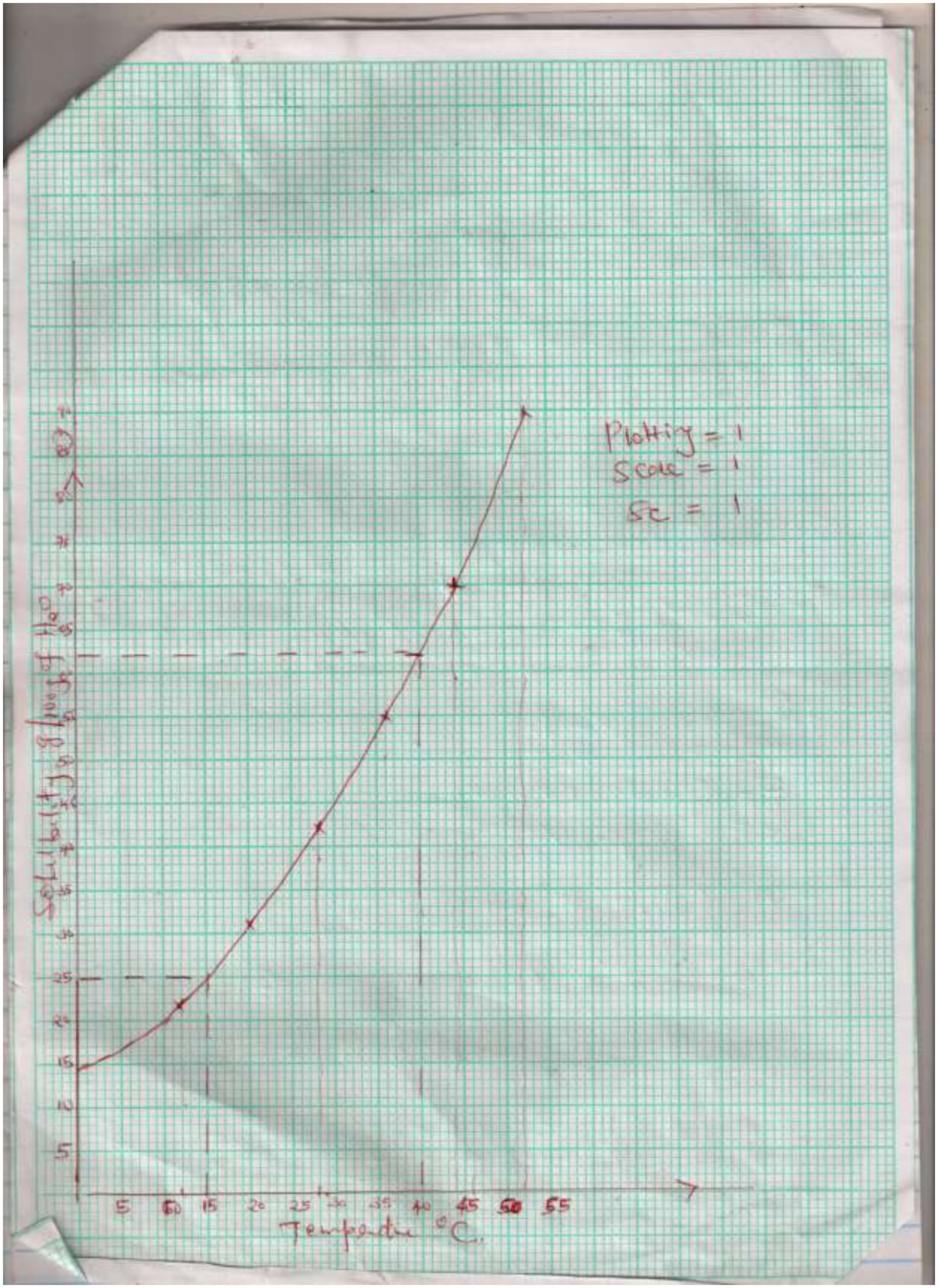
(c) (i) Platinum - Rhodium Catalyst (1mk)

(ii) (a) It is not easily poisoned
(b) It is cheap. (2mks)

(d) Blue crystal of copper (II) sulphate turns white. Con H_2SO_4 is a drying agent (2).

(e) oxidising agent (1mk).

(f) - Manufacture of fertilizers.
- processing of metal ores (2mks)
- Manufacture of detergents
- Manufacture of plastic
- Manufacture of dyes and paint (any two)
- used in lead acid accumulators


Plotting = 1
Scale = 1
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Temperature °C.

3(a) Saturated solution is a solution that cannot dissolve any more solute at a given temperature ✓1

(b)(ii) (I) 25g/100g of water ✓1

(ii) 80g/100g.
40°C solubility of KNO_3 = 60g/100g of H_2O ✓1

80 − 60 = 20g ✓1

(c) at 15°C solubility = 25g/100g of water ✓1mk

Relative Mola mass of KNO_3 = K 39
N 14 ✓1mk
30 48
101

$= \frac{25}{101}$

= 0.2475 moles in 100cm³

x → in 1000

$x = \frac{1000 \times 0.2475}{100}$

= 2.475M ✓1.

4(a) Copper (II) Carbonate ✓ (1mk)
(ii) Carbon (IV) Oxide (1mk)

(b) $Cu^{2+}_{(aq)} + CO_3^{2-}{}_{(aq)} \rightarrow CuCO_3$ (1mk)

(c) $[Cu(NH_3)_4]^{2-}$ (1mk).

(ii) (a) Bubbling / effervescence. (1mk)

(b) The reaction of H_2SO_4 with $CaCO_3$ would take place for short time the stop. This is due to formation of insoluble coating of $CaSO_{4(s)}$. (1mk)

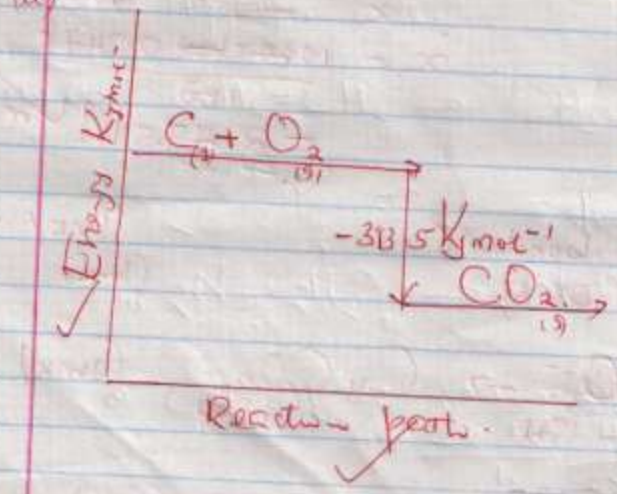
(c) To absorb traces of $HCl_{(g)}$.

(d) $Ca(OH)_{2(aq)}$ forms white ppt while $NaOH_{(aq)}$ does not

5. (a) Molar enthalpy of combustion, is the amount heat evolved 1mole of substance undergoes complete combustion. (1mk).

(b) (i) ΔH_2 = Molar enthalpy combustion of Carbon. (1mk)

(ii)



- Axis = 1mk.
- Reactant as products 1mk
- Energy change 1mk

(iii) $3C + 4H_2 \xrightarrow{-103.7} C_3H_8$

$3(-393.5)$ $\quad 4(-285.8)$ $\quad x$ $\quad$ 1 mol

$3CO_2 + 4H_2O$ ✓1mk.

$-103.7 + x = 4(-285.8) + 3(-393.5)$

$x = -1143.2 - 1180.5$

2323.7

$x = -2220$ Kj/mol

(c) $H-C(H)(H)-C(H)(H)-O-H$ ✓m1 ✓m1

$5(C-H) = 5(-414) = 2070$

$1(C-C) = -1(-346) = 346$

$(C-O) = 1(-360) = 360$

-2776

$-3239 - (-2776)$

$= -463$ Kj/mol ✓m1

(d) (a) The experiment should carried in a fume chamber or in a open place ✓m1

(b). It should done in a dry condition ✓m1.

(ii) $16HCl_{(aq)} + 2KMnO_{4(s)} \rightarrow 5Cl_{2(g)} + 2MnCl_{2(aq)} + 8H_2O_{(l)} + 2KCl_{(aq)}$ ✓m1

(iii) Manganese (iv) oxide (m1).

(iv) To produce Cl_2 gas to force air out which could otherwise reacted with aluminium to aluminium oxide hindering the reaction. ✓m1

(v) $2Al_{(g)} + 3Cl_{2(g)} \rightarrow 2AlCl_{3(s)}$ ①

(b) (i) Moist Calcium hydroxide.
- Ammonia is highly soluble in water. ①

(ii) Method of collecting the gas. ✓①
→ Ammonia is less dense than air.

(iii) Calcium oxide (quick lime)

(iii) $Ca(OH)_{2(s)} + 2NH_4Cl_{(s)} \rightarrow CaCl_{2(s)} + 2H_2O_{(l)} + 2NH_{3(g)}$ ✓①

(iv) Ammonia turns moist red litmus paper blue ✓①

7. (a) (A) Ethene ✓ 1/2
B = Ethane ✓ 1/2.
E = Carbon (iv) Oxide ✓ 1/2.
G = Hydrogen ✓ 1/2.

(b) (i) $CH_2=CH_2 \rightarrow CH_3CH_3$ 1mk

(ii) $2C_2H_6 + 5O_2 \rightarrow 4CO_2 + 6H_2O$ ✓mk.

(iii) $2Na_{(s)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(aq)} + H_{2(g)}$ (1mk).

(c) CH_2CH_2 2C $2 \times 12 = 24$
4H $\frac{4 \times 1}{b} = \frac{4}{28}$ ✓m

$n = \frac{42000}{28}$ ✓

$28n = 42000$ $= 1500$ molecules

(d) (i) High temperature (1mk).

(ii) Platinum (1mk)