233/1

CHEMISTRY

PAPER 2

THEORY

TIME – 2HRS

SUKELLEMO PRE MOCK JOINT EXAMS

Pre Mock Examination

JUNE 2022

MARKING SCHEMES

a)i) To remove dust particles√ - than would otherwise "poison" that catalyst (1mk)

ii) 9 atmospheres √1 (1mk)

iii) To pre heat NH_3 and air to an optimum temperature (reactants)√

To cool No (product) √ (2mks)

iv) Platinum –Rhodium catalyst √ (1mk)

v) I : $4NH_{3(g)} + 5O_{2(g)} \longrightarrow 4NO_{(g)} + 6H_2O_{(g)}$ √1 (1mk)

II : $2NO_{(g)} + O_{2(g} \longrightarrow 2NO_{2(g)}$√1 (1mk)

III $4NO_{2(g)} + O_{2(g)} + 2H_2O_{(l)} \longrightarrow 4\ HNO_{3(aq)}$

b)i)

$2NaNO_{3(S)} \longrightarrow 2NaNO_{2(g)} + O_{2(g)}$√

$NaNO_3 = 23 + 14 + 48 = 85$

Moles of $NaNO_3 = \frac{21.25√}{85}$ ½ (3mks)

Moles of $O_2 \Rightarrow$ ½ x 0.25

= 0.125 √ ½

Volume of $O_2 \Rightarrow$ 09.125 X 22.4

$= 2.8dm^3$

$V = 280\ cm^3$

ii) Manufacture of fertilizers√

Manufacture of explosives√

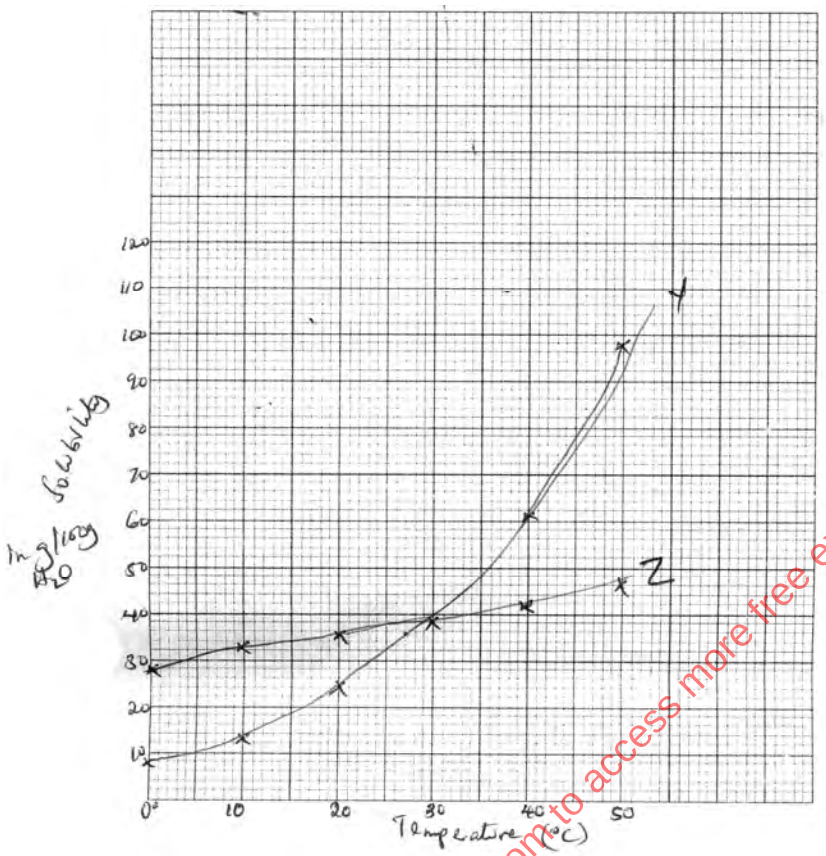
Manufacture dyes and drugs √ (2mks)

Purification of metals eg.silver and gold

Etching designs on some metals

2. (a) this is the maximum mass of salt/solute that can saturate 100g of water at a given temperature.

(b)



(c) (i) 30g of H_2O Accept 36g/100g water

(ii) 33.5°C

(d) (i) Sol at 40oC = 61g/100g H_2O

At 27°C

(ii) Sol at 40°C = 61g/100g H_2O

Sol at 27°C = 35g/100g H_2O

Sol at 5°C = 10g/100g of H_2O

(e) Y is more soluble than Z.

Y dissolves better at higher temperatures than Z

(f) Fractional crystallization – Separation of mixtures with different solubilities

3. (a) (i) I: $Zn(OH)_2$ ✓1
II: $ZnCl_2$ ✓1
III: ZnO ✓1

(ii) $Pb^{2+}_{(aq)} + 2Cl^{-}_{(aq)} \rightarrow PbCl_{2\,(S)}$ ✓1

(iii) White precipitate soluble in excess. ✓1

(b) Ammonia gas is polar and ionizes ✓1 in water which is polar.
While it does not ionize in methylbenzene which is non polar.

(c) (i) Calcium carbonate/magnesium carbonate.

(ii) Passing a solution of dilute hydrochloric acid or nitric (V) acid in the boiler. (1mk)

(d) $[Zn(OH)_4]^{2-}$

4a

i) Hygroscopy
ii) Deliquescence
iii) Efflorescence

b) i) $\left[(Zn(OH)4)\right]^{2-}$ ✓1mk ii) $\left[Cu(OH)_4\right]^{2-}$ √1

Fe	S	O	H_2O
20.2	11.5	23.0	45.3
56	32	16	18
0.36	0.36	1.44	2.52✓1mk
1	1	4	7

$(FeSO_4.7H_2O)=278$
$278n=278$
$n=1$✓1mk
Formula $FeSO_4.7H_2O$✓1mk

ii) No. of moles $\frac{6.95}{278} = 0.025moles$ ✓1mk

0.025moles-$250cm^3$

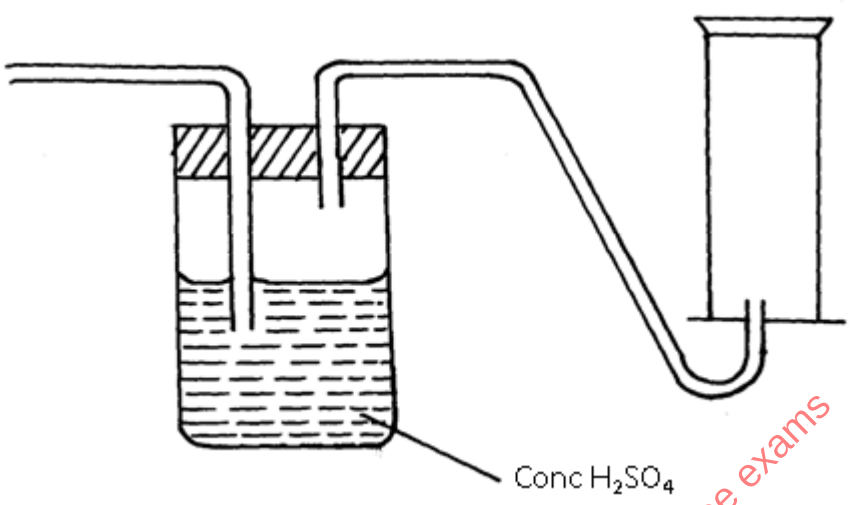
1000

$\frac{0.025x1000}{250} = \frac{25}{250} = 0.1mole/litre$ ✓1mk

d)

- Add exess lead carbonate to dilute HNO_3, ✓ 1mk
- shake and filter to remove unreacted carbonate ✓½mk
- Add excess dilute HCl to the mixture ✓½mk
- Filter to obtain lead(II) chloride as the residue ✓½mk
- Rinse and Dry between filter paper to obtain solid $PbCl_2$✓½mk

5. i)



ii) – Catalyst Nickel
- Temperature 150ºC to 250ºC

iii) magnesium is very expensive
it gives a mixture of gases including bad smelling and poisonous hydrogen sulphide

$CuSO_4.5H_2O$

v) – Manufacture of ammonia
- Manufacture of hydrochloric acid
- Welding and cutting of metals
- Rocket fuel and in fuel cells.

b) i) Slowly to allow ample time for reaction repeatedly to ensure all active air (oxygen) is used up
ii) The brown copper turnings slowly changed black.

iii) $\frac{120-95.5}{120} x100$

$\frac{24.5}{120} x100$ = 20.41667%

6. (a) B – 2 : 8 √ ½

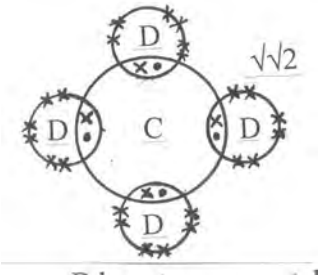
D – 2 : 8 : 8 √ ½

(b) (i) D √ ½

(ii) E √ ½

(c) Atomic radius of B is larger √1 than that of C. C has more protons. The outer energy level electrons are pulled √1 strongly to the nucleus reducing the atomic size.

(d)



(e) Element B has stronger metallic √1 bond (has more delocalized electrons) than A, hence higher amount of heat √1 energy is needed to break the bond.

(f) $2A_{(s)} + 2H_2O_{(l)} \longrightarrow 2AOH_{(aq)} + H_{2(g)}$ √1

- Reject fully if unbalanced

- Award ½ mk if states are missing or any one state is wrong.

(g) Add water √ ½ to the mixture and stir.

Filter √ ½ to obtain lead (II) sulphate as √ ½ residue and sulphate of E as filtrate

Dry the residue √ ½ to obtain lead (II) sulphate.

Evaporate √ ½ the filtrate to dryness √ ½ to obtain the solid sulphate of E.

a) Ethylpropanoate
b) But-2,3-diene

b) i) A - yeast √1 (1mk)

I - fractional distillation (1mk)

B - Sodium ethoxide (1mk)

C - Hydrogen (1mk)

D - Ethene (1mk)

E – polyethene / polythene (1mk)

(4mks)

iii) I : $C_6H_{12}O_6 \rightarrow 2C_2H_5O + 2CO_2$ √ (1mk)

$$moleofsugar \frac{144000}{180} = 800moles$$

$$molesofethanol = \backslash 2x800$$

$$= 1600moles$$

II (3mks)

$$nfm \rightarrow 2x12 + 6 + 16 = 46$$

$$massofethanol = \frac{46x1600}{1000}$$

$$= 73.6kg$$