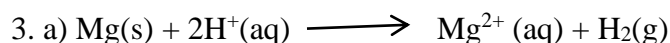


MURANG`A EAST 2021 [K.C.S.E TRIAL
CHEMISTRY
PAPER ONE
233/1
MARKING SCHEME

1. a) Existence of element in more than one physical form in the same state
 - b) Graphite, diamond
 - c) Making of carbon papers / making tyres/ making printers ink
- 2.

FeSO ₄	H ₂ O
Mass 2.84	2.36
<u>RFM</u> 152	18
No of moles $\frac{2.84}{152} = 0.0187$	$\frac{2.36}{18} = 0.1311$
Mole ratio $\frac{0.0187}{0.0187} = 1$	$\frac{0.1311}{0.0187} = 7$



b) Acid R is stronger than acid S

Acid S is stronger acid while S is weak acid

It produces more H⁺ ions which react with magnesium

It ionizes fully in water or it produces high volume of hydrogen.

4. a) They gain K.E

They gain energy and vibrate faster

b) T₁ – Melting point

T₂ – Boiling point

c) Energy is used to weaken the intermolecular force of attraction so as to change the substance from solid to liquid state.

5. Mass of solution = 128.9 - 94.3 = 34.6 (g)

Mass of dry salt = 103.9 - 94.3 = 9.6 (g)

Mass of solvent = 34.6 - 9.6 = 25 (g)

25.0g of solvent containing 9.6g

100g =? $\frac{9.6}{25} \times 100$

25

Solubility = 38.4g/100g of water

6. a) Nitric (v) acid is more volatile than conc sulphuric (vi) acid or
Nitric (v) acid has a lower B.P than Sulphuric (vi) acid.

b) Sodium nitrate

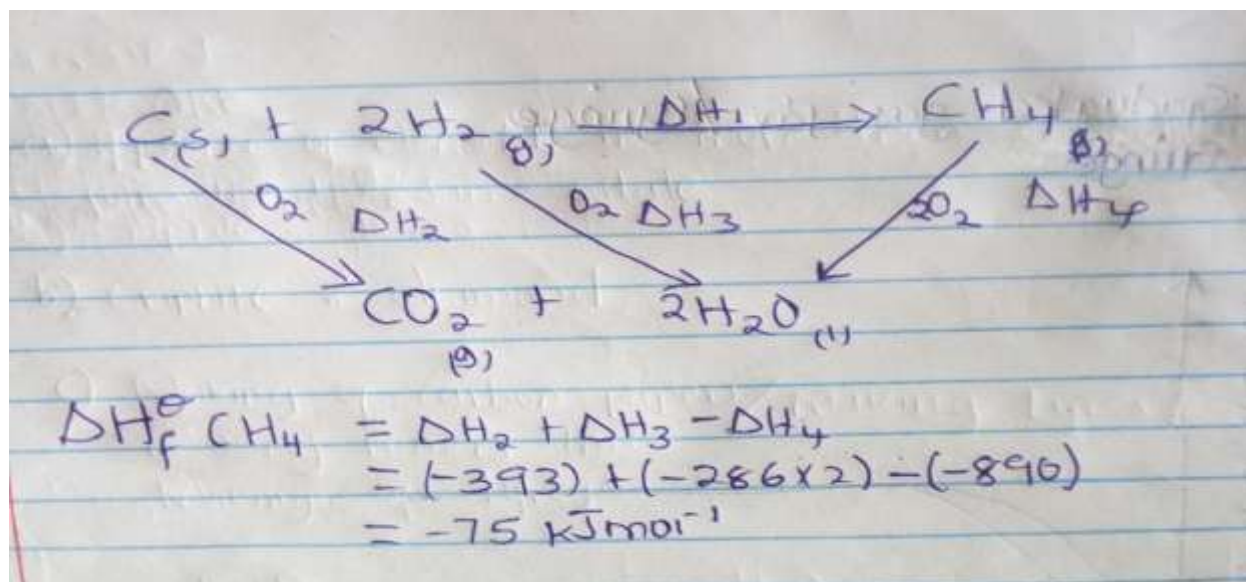
7. React excess lead oxide with the nitric acid filter to form lead nitrate solution. Dissolve sodium sulphate in water to form solution. Mix sodium sulphate solution with lead nitrate solution to precipitate lead sulphate. Filter, wash the residue to dry between filter paper.

8 a) Z – concentrated nitric (v) acid

Y – Ammonia solution / ammonium hydroxide, aqueous ammonia.

b) $(\text{Cu}(\text{NH}_3)_4)^{2+}$

9.



10. a) Brown colour intensifies, Reaction is exothermic
Increasing the heat will favour backward reaction
Equilibrium shift to the left and this reaction absorbs heat

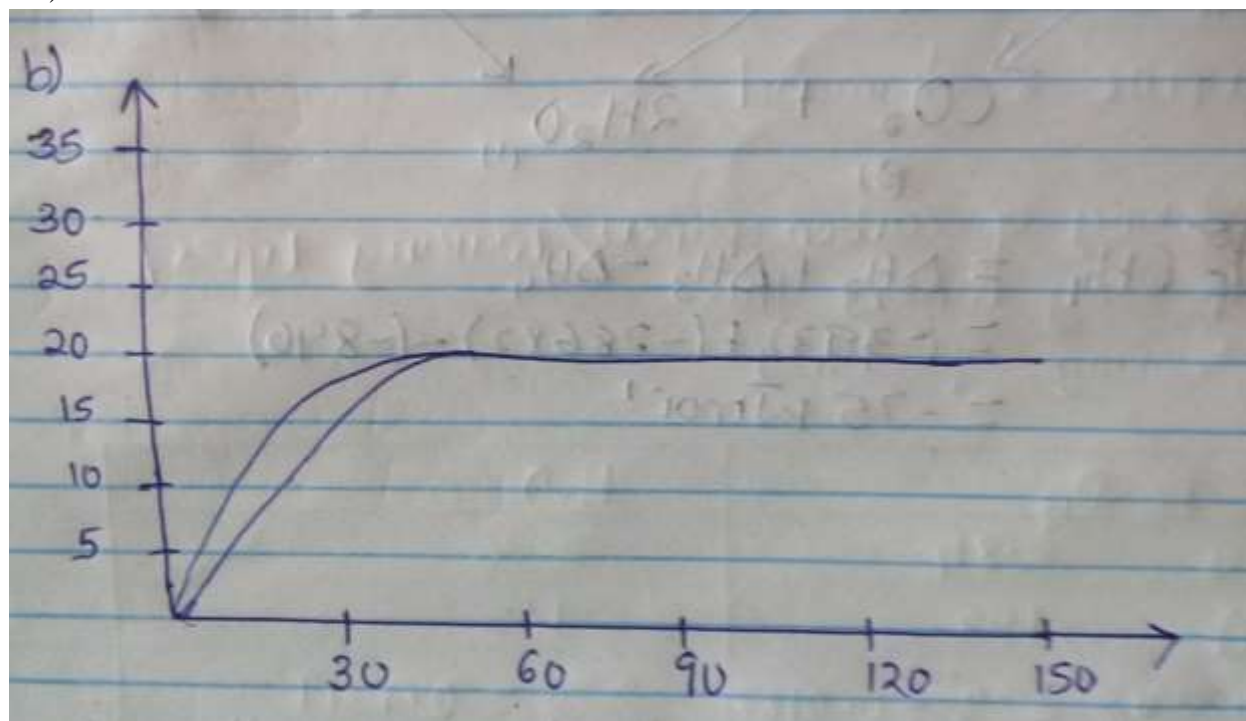
b) Pale yellow colour intensifies
Equilibrium shifts to the right because volume is reduced

- 11 a) B – Unburnt gas/colourless region/almost colourless region
C – Pale blue region

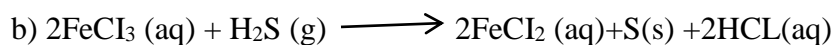
b) Regulating amount of air entering the chimney

- 12 a) Graduated gas jar / syringe

b)



- 13 a) The solution turned from yellow to pale green
Red brown to pale green/ brown to pale green



14. a) P and M, They have same atomic number

$$\text{b) } n = 15 - 7 \\ = 8$$

15 a) Identify the solid P

Sodium Sulphite / Potassium Sulphite

b) i) Its denser than air /it was bleached/ it turned white.

ii) Remained red

16 a) The volume of a fixed mass of gas is directly proportional to its absolute temperature at constant pressure.

$$b) \frac{V_1}{T_1} = \frac{V_2}{T_2} \quad \frac{0.048}{298} = \frac{0.032}{T_2} \quad T_2 = 198.667 \text{ K}$$

$$17 \text{ R.A.M} = \frac{7}{10} \times 62 + \frac{3}{10} \times 64 \\ = 43.4 + 19.2 \\ = 62.6$$

18 a) Sublimation

b) Esterification

19 a) i) N

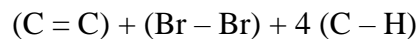
ii) G

b) E.M.F cell = E reduction – E oxidation

$$= (+ 1.36) - (-2.92)$$

$$= + 4.29\text{v}$$

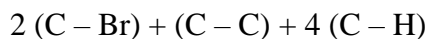
20 a) Bond breaking



$$+ 610 \text{ KJmol}^{-1} + 193 \text{ KJmol}^{-1} + 1652 \text{ KJmol}^{-1}$$

$$= 2455 \text{ KJmol}^{-1}$$

Bond formation



$$560 + 346 + 1652$$

$$= 2558$$

Heat of reaction = Bond breaking + Bond formation

$$\begin{aligned} &= 2455 \text{ KJmol}^{-1} + (- 2558 \text{ KJmol}^{-1}) \\ &= -103 \text{ KJmol} \end{aligned}$$

b) Addition reaction/Halogenation/Exothermic/Bromination

21. Add warm water to the mixture and stir

PbCl₂ dissolves while silver chloride does not

Filter to obtain lead(ii) chloride as filtrate
and silver chloride as residue.

Cool the filtrate to obtain solid lead (ii) chloride

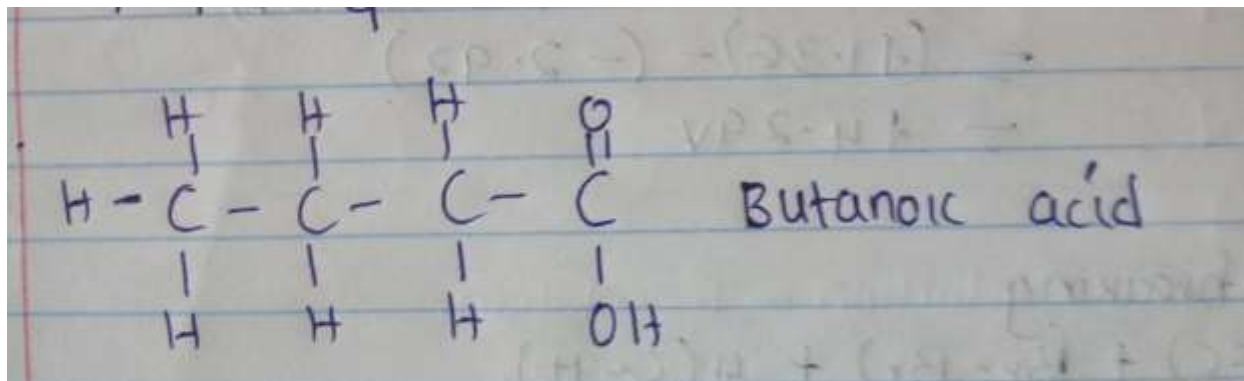
22. Lead (ii) carbonate react with dilute hydrochloric acid

to form an insoluble coat of lead (ii) chloride
on the carbon which stops further reaction

23 a) S because it has a high M.P and B.P and also conducts in aqueous solution

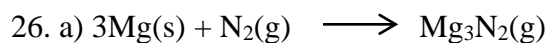
b) P or Q

24.



25. i) Carbon (iv) oxide / CO₂

ii) Leads to global warming/greenhouse effect/acid rain



b) Neon/Argon, it is noble gas

27 i) Quantity of = 1t
Electricity = $6.42 \times 10 \times 60$
= 6.42×600
= 3.852C

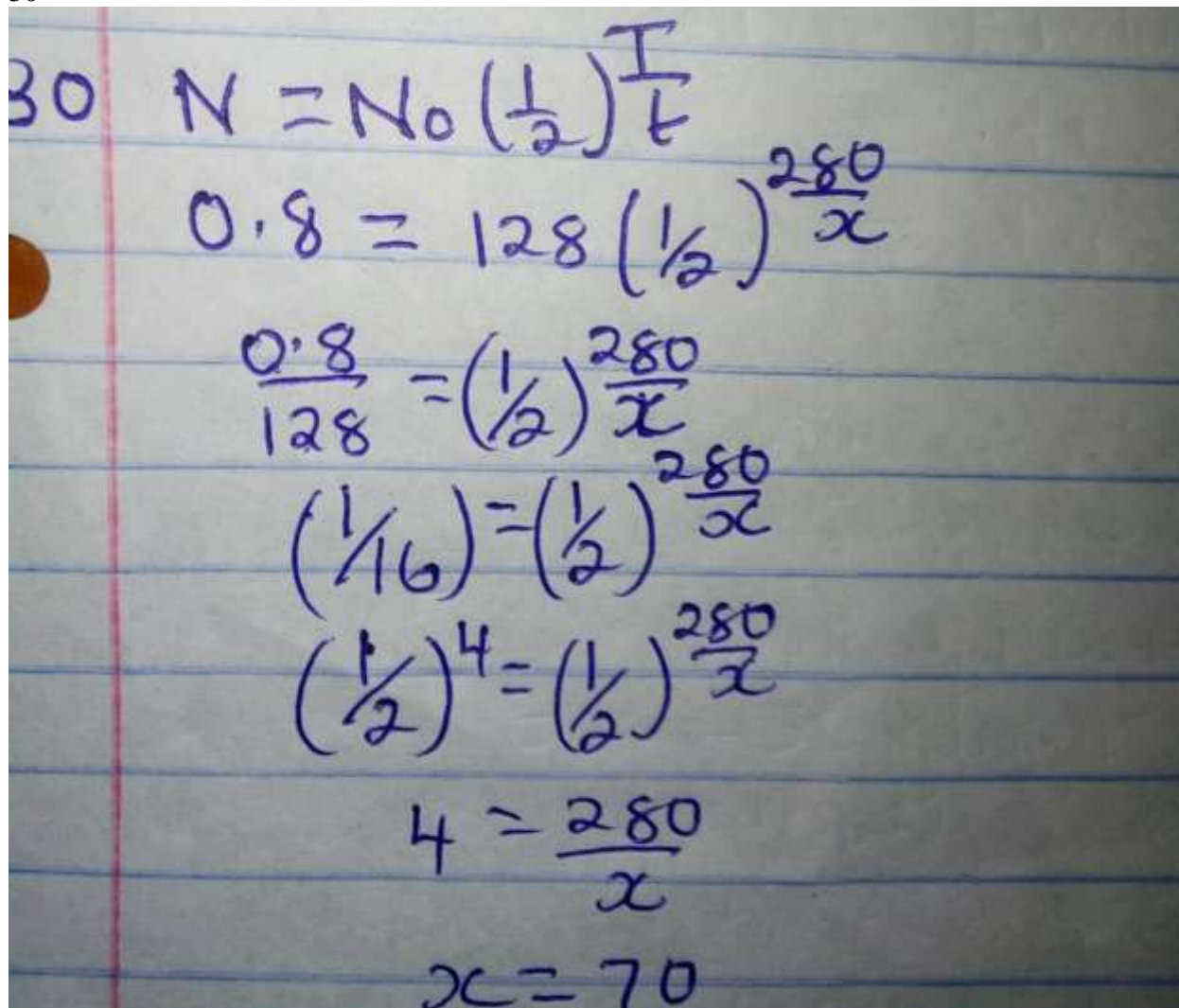
ii) 3852c produce 2.74g
 $2 \times 96500 = \frac{2 \times 96500 \times 2.74}{3852}$

= 137.28

28 AlCl_3 is largely covalent /it sublimes when heated
It is made of molecules which do not conduct electricity.

29. i) Polyphenylethane/polystyrene
ii) It is non-biodegradable/pollutes environment

30



$$30 \quad N = N_0 \left(\frac{1}{2}\right)^{\frac{t}{t_{1/2}}}$$

$$0.8 = 128 \left(\frac{1}{2}\right)^{\frac{280}{x}}$$

$$\frac{0.8}{128} = \left(\frac{1}{2}\right)^{\frac{280}{x}}$$

$$\left(\frac{1}{16}\right) = \left(\frac{1}{2}\right)^{\frac{280}{x}}$$

$$\left(\frac{1}{2}\right)^4 = \left(\frac{1}{2}\right)^{\frac{280}{x}}$$

$$4 = \frac{280}{x}$$

$$x = 70$$

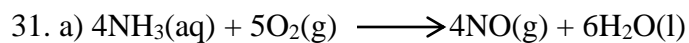
12.8(g) ——— 6.4g ——— 3.2g ——— 1.6g ——— 0.8g

$$4 \text{ t } \frac{1}{2} = 280 \text{ days}$$

$$t_{1/2} = \frac{280}{4}$$

4

$$= 70 \text{ days}$$



b) $\text{HNO}_3(\text{aq})$ and $\text{HNO}_2(\text{aq})$

32. The laboratory gas burns in excess oxygen / burns completely/produces CO_2 and H_2O

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only/No unburnt carbon remains/No soot is produced.