MERU CENTRAl CLUSTER FORM FOUR TERM TWO EXAMINATION.

FORM FOUR TERM TWO EXAM - 2020

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
RFM 152	18
No of moles $\frac{2.84}{1.52}$ = 0.0187	$\frac{2.36}{18}$ = 0.1311
Mole ratio $\frac{0.0187}{0.0187}$ =1	$\frac{0.1311}{0.0187}$ = 7

   E.F = FeSO$_4$.7H$_2$O

3. a) Mg(s) + 2H$^+$(aq) $\longrightarrow$ Mg^{2+} (aq) + H$_2$(g)

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   =? $\underline{9.6 \times 100}$
                        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.
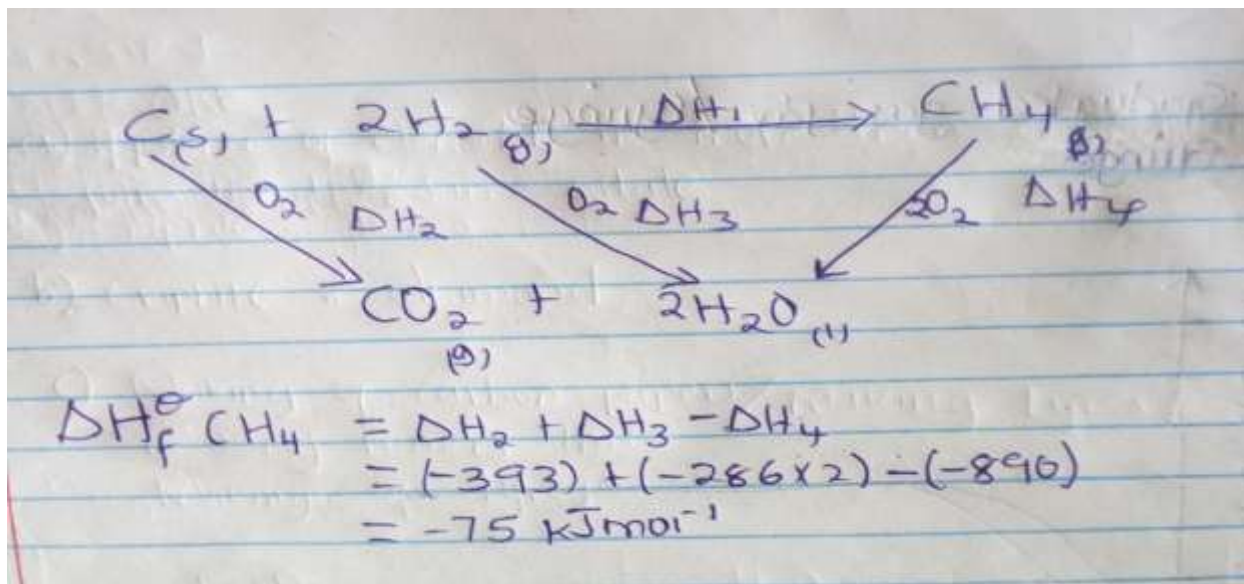

   b) Sodium nitrate

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) $(CU\ (NH_3)_4)^{2+}$

9.

$$C_{(s)} + 2H_{2(g)} \xrightarrow{\Delta H_1} CH_{4(g)}$$

$$\Delta H_f^{\ominus} CH_4 = \Delta H_2 + \Delta H_3 - \Delta H_4$$
$$= (-393) + (-286 \times 2) - (-890)$$
$$= -75 \text{ kJmol}^{-1}$$

10. a) Brown colour intensifies, Reaction is exothermic

   Increasing the heat will favour backward reaction

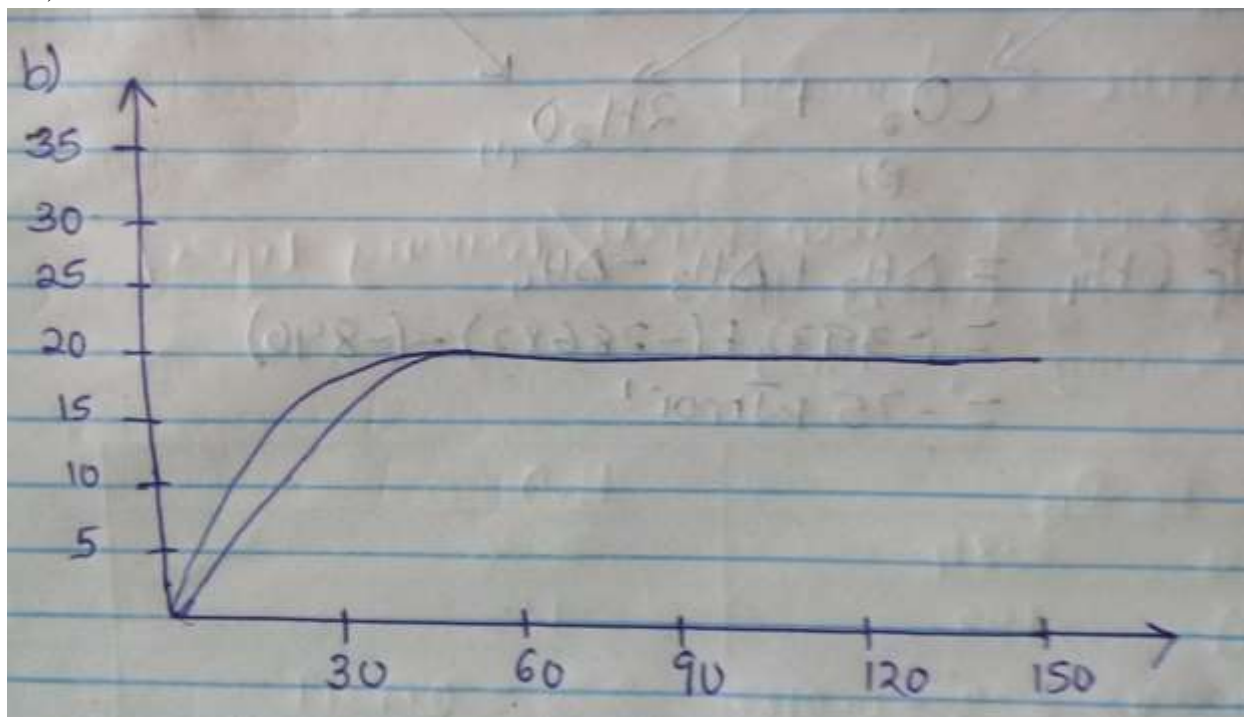   Equilibrium shift to the left and this reaction absorbs heat

   b) Pale yellow colour intensifies

   Equilibrium shifts to the right because volume is reduced

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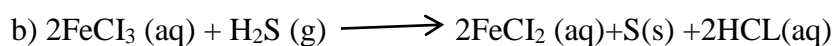
   C – Pale blue region

   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

b) $2FeCl_3 (aq) + H_2S (g) \longrightarrow 2FeCl_2 (aq) + S(s) + 2HCl(aq)$

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

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) $\dfrac{V1}{T1} = \dfrac{V2}{T2}$ $\dfrac{0.048}{298} = \dfrac{0.032}{T2}$ $T2 = 198.667$ K

17 R.A.M $= \dfrac{7}{10}$ X $62 + \dfrac{3}{10}$ X 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)

              = + 4.29v

20 a) Bond breaking

   (C = C) + (Br – Br) + 4 (C – H)

   + 610 KJmol^{-1} + 193 KJmol^{-1} + 1652 KJmol^{-1}

      = 2455 KJmol^{-1}

   Bond formation

   2 (C – Br) + (C – C) + 4 (C – H)

      560 + 346 + 1652

         = 2558

   Heat of reaction = Bond breaking + Bond formation

                    = 2455 KJmol^{-1} + (- 2558 KJmol^{-1})

                    = -103KJmol

b) Addition reaction/Halogenation/Exothermic/Bromination

21. Add warm water to the mixture and stir

    $PbCl_2$ 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

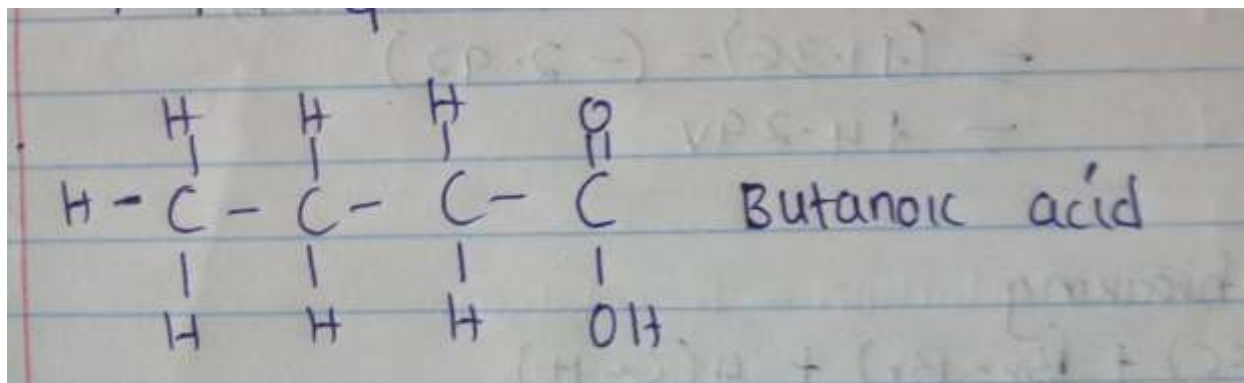22. Lead (ii) carbonate react with dilute hydrochloric acid

    to form an insoluble coat of lead (ii) chloride

    on the carbon which stops further reaction

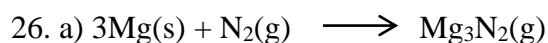23 a) S because it has a high M.P and B.P and also conducts in aqueous solution

    b) P or Q

24.

25. i) Carbon (iv) oxide / CO_2

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

26. a) $3Mg(s) + N_2(g) \longrightarrow Mg_3N_2(g)$

    b) Neon/Argon, it is noble gas

27 i) Quantity of   = 1t

    Electricity   = 6.42 x 10 x 60

                  = 6.42 x 600

                  = 3.852C

ii) 3852c produce 2.74g

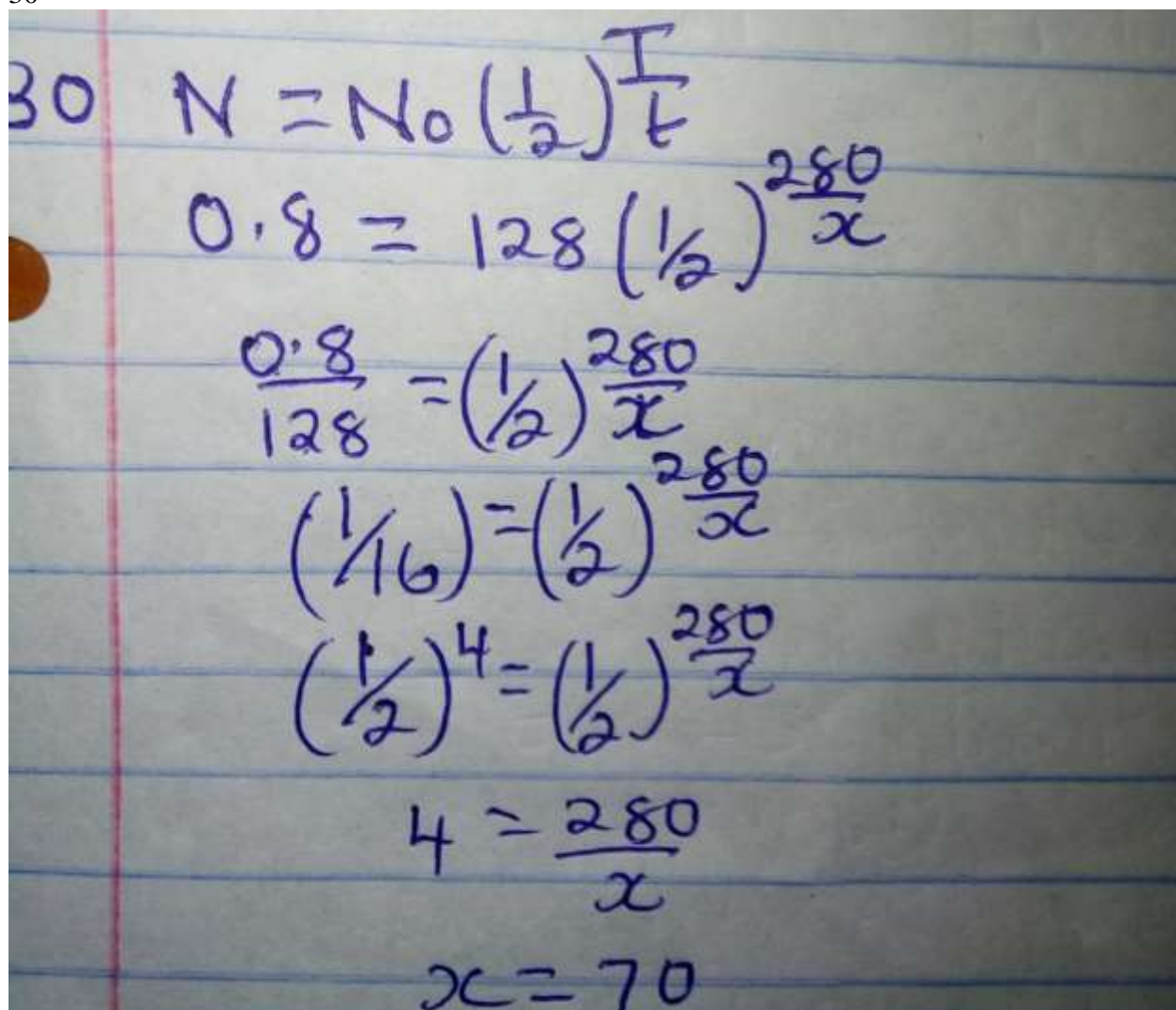$$2 \times 96500 = \frac{2 \times 96500 \times 2.74}{3852}$$

$$= 137.28$$

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

$$N = N_0 \left(\frac{1}{2}\right)^{\frac{T}{t}}$$

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

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

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

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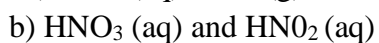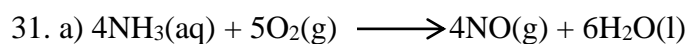
$$4 = \frac{280}{x}$$

$$x = 70$$

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

$4\ t\ ½\ = 280$ days

$t1/2 = \dfrac{280}{4}$

$= 70$ days

31. a) $4NH_3(aq) + 5O_2(g) \longrightarrow 4NO(g) + 6H_2O(l)$

b) HNO_3 (aq) and HNO_2 (aq)

32. The laboratory gas burns in excess oxygen / burns completely/produces CO_2 and H_2O only/No unburnt carbon remains/No soot is produced.