233/2: CHEMISTRY PAPER 2

NAMBALE ACK DIOCESE JOINT EXAMINATION 2021

Kenya Certificate of Secondary Education

MARKING SCHEME

1. a) M $^{1}/_{2}$mk and R$^{1}/_{2}$mk.

   The ionic radius is larger 1mk than the atomic radius implying they gain electrons.

   b) I Q=2 1mk

   R=3 1mk

   II QM_2 1mk

   III Metallic (1mk

   c) The oxide of P is ionic (1mk) with a giant ionic structure that requires a lot of energy to break, the oxide of R is molecular. 1mk

   d) M and K 1mk

   M is a non-metal with the smallest (½mk) atomic radius hence most electronegative

   K is a metal with the largest atomic radius (½mk) hence most electropositive.

   e) Has high melting point (1mk) and good conductor (1mk) of heat being a metal.

2. a) i.- scale(Imk)

   -Plotting all points correctly (Imk)

   - Curve (1mk)

   ii.0.188- 0.12 = 0.068 mol (Imk)

   Therefore, mass of hydrated copper(II) sulphate

   = 0.068 x 250 (1mk)

   = 17g (1mk)

b)i. Moles of $AgNO_3$ = $\frac{0.1 \times 24.1}{1000}$ = 2.41×10^{-3} (1mk)

ii.Moles of NaCI = Moles of $AgNO_3$
= 241×10^{-3} (1mk)

iii.Moles of NaCl in $250cm^3$ = $2.41 \times 10^{-3} \times \frac{250}{25}$
=2.41×10^{-2} (1mk)

iv. R.F.M Na CI = 23 + 35 .5 = 58.5
Mass of NaCl in $5cm^3$ = 2.41 x 10-2 x 58.5
= 1.41g (1mk)

v. Mass of water = 5.35 – 1.41
= 3.94g (1mk)

vi.3.94 of water contains 1.41g of NaCl
100 g of water = $\frac{1.41 \times 100}{3.94}$ (1mk)
=35.7 (1mk)

3. a)

i. To remove carbon(iv) oxide. (1mk)

ii. To dry the air (1mk)

b)

i. Turn from red brown to black (1mk)

Copper is oxidized to copper (ii) oxide (1mk)

ii. 80-63.2cm^3 = 16 .8 cm^3 (1mk)

$\frac{16.8}{80} \; x \; 100$

21% (1mk)

iii. Nitrogen. (1mk)

iv. Impure (1mk) it contains noble gases like Argon. (1mk)

c) $4Na\ (s) + O_{2(g)} \longrightarrow 2Na_2O(g)$

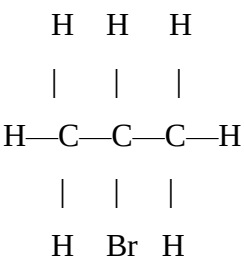
$2Na\ (s) + O_{2(g)} \longrightarrow Na_2O_2(g)$

4. (a) A: Hydrogen Gas (1mk)

B: Carbon (IV) oxide gas. (1mk)

C: Polypropene. (1mk)

(b)



(1mk)

2 – bromopropane (1mk)

(c) D: Dehydration (1mk)

E: Oxidation (1mk)

F: Polymerization (1mk)

G: Hydrogenation/additional hydrogenation (1mk)

(d) Condition: Sunlight/U.V rays/U.V light (1mk)

Reagent: Chlorine gas. (1mk)

(e) $C_3H_{8(g)} + 5O_{2(g)} \rightarrow 3CO_{2(g)} + 4H_2O_{(l)}$ (1mk)

(f) D: Alkenes. (1mk)

E: Alkanoic acids. (1mk)

(g) $(CH_3CHCH_2)_n = 63000$

$42n = 63000$

$n = 1500$. (1mk)

5. a) i) Chlorine (1mk) Has a higher reduction potential (1mk)

ii) +1.36 - (- 2.36) = +3.72

b) i) P and Q

ii)

iii) +1.50 – (-0.44) += + 1.94v

c) Q = 4 X 16 X 60 = 3840C (1mk)

1.174g _____ 3840

59 g _____ $\frac{59 \times 3840}{1.174}$ = 192,981.261 C (1mk)

If 96,500C_____ IF

192891.261C _____ $\frac{192981.261 \times 1}{96500}$

Charge of X = +2

Formula $X(NO_3)_2$ (1mk)

6. a) i) Graphite/ Titanium (1mk). They do not react with chlorine gas (1mk)

ii) A steel diaphragm is suspended between the electrodes. (1mk)

iii) $2Cl^-(aq) \longrightarrow Cl_{2(g)} + 2e$ (1mk)

b) i) Calcium Chloride (1mk)

ii) To reduce the cost of production. (1mk)

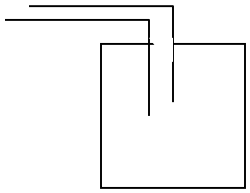
c) Hydrogen ions will be preferentially discharged at the expense of sodium ions at the cathode. (1mk)

At the anode, hydroxyl ions will be preferentially discharged at the expense of chloride ions (1mk)

d) making sodium compounds such as sodium cyanide which is used in extraction of gold (1mk)

sodium and potassium alloy is used as a coolant in nuclear reactors (1mk)

7. a) (i) (1mk)



(ii) I iron II Sulphide or copper II Sulphide (1mk)

II anhydrous Calcium Chloride. (1mk) (Reject Calcium chloride)

III $FeS_{(s)} + HCl_{(aq)} \longrightarrow FeCl_{2(aq)} + H_2S_{(g)}$ (1mk)

b) Fe^{3+} is reduced or Fe^{2+} (1mk)
H_2S is oxidized to sulphur. (1mk)

c) (i) Vanadium V oxide or platinised asbestos (1mk)

(ii) I. The yield of SO_3 increase because increase in pressure favour the forward reaction since less number of molecules of SO_3 (1mk)

II. The yield of SO_3 is the same because catalyst only speeds the rate at which equibrium is attained. (1mk)

(iii) Exothermic reaction occurs. When dissolved in water produce acid spray (fumes) cause pollution. (1mk)