

*Kenya Certificate of Secondary Education*

**233/1**

**CHEMISTRY**

**PAPER 1**

**THEORY**

**MARKING SCHEME**

1. (a) 20K 2.8.8.2 *√1mk*

8M 2.6. √*1 mk*

(b) K 2.8.8.2 Loose K2+ √*1 mk*

2e

M 2.6 Gain M2- √*1 mk*

2ē

1. (a) Anode

2Br-(l) Br2(g) + 2ē √*Balmk*

*√S.S 1 mk*

(b) Cathode

Pb(l)2+ + 2ē Pb(s) √*1 mk*

1. Increase in temperature increases the kinetic energy of positive centres (nucleous) and the electrons making positive centres and electrons to vibrate more. √*1 mk*

This increases the collisions between the positive centres and electrons increasing resistance of the metal hence decreasing conductivity. √*1 mk*

1. Z Y X √*1 mk*

Decreasing order

1. Add water to the mixture and stir to dissolve sodium chloride leaving copper (ii) oxide which is insoluble. √*1 mk*

Filters to remove copper (ii) oxide as residue and sodium chloride as filtrate √*½ mk*

Evaporate the filtrate to obtain sodium chloride crystals. √*½ mk*

1. (i) Hot platinum wire glows red. √*½ mk*

(ii) Brown fumes are observed √*½ mk*

Explanation

Reaction between oxygen gas and ammonia over platinum wire is exothermic √*1 mk*

Ammonia is oxidized in presence of platinum catalyst to produce nitrogen (ii) oxide (√*½ mk)* which is further oxidized to nitrogen (iv) oxide. √*½ mk*

1. (a) B- Lie berg condenser.*√1mk*

(b) Thermometer – To maintain the temperature for distillation. *√1mk*

(c) Liquid C√*1mk*

X

x

C

X

x

O

O

O

O

O

O

O

√*2mks*

1. (a) (i) Liquid H = Water √*1mk*

(ii) G - Nitrogen (i) oxide √*1mk*

(b) Physical test- Test the boiling point and melting point.

Boiling point should be 1000C and melting point 00C at sea level *Any 1 x 1 = 1mk*

Chemical test- Turns white anhydrous copper (ii) sulphate to blue. *1mk*

Turns blue anhydrous cobalt (ii) chloride to pink. *Any 1 x 1 = 1mk*

1. (a) Remove / absorb carbon (iv) oxide √*1mk*

(b) 3Mg(s)+ N2(g)  Heat Mg3 N2(s) √*1mk*

(c) Neon / Argon √*1mk*

* Are inert gases / unreactive gases and therefore do not react with magnesium. √*1mk*

1. (a) But - I - ene √*1mk*

(b) Pent – 2 – ene √*1mk*

1. (a) Amphoteric oxide √*1mk*

(b) Lead (ii) oxide / Zinc oxide / Aluminium (iii) oxide √*1mk (Ignore formula)*

1. (i) B √*1mk*

Sodium chloride is soluble in water since its ionic and do not conduct electricity in solid state but conducts electricity in molten state. √*1mk*

(ii) Metallic bond √*1mk*

(iii) Giant atomic / covalent structure √*1mk*

1. Element Ba S O

% Composition 58.81 13.72 24.47

RAM 137.0 32.0 16.0

No. of Moles 58.81 13.72 24.47

137 32 16 √*½ mk*

= 0.4293 0.4281 1.7168

Simplest ratio 0.4293 0.4281 1.7168

0.4281 0.4281 0.4281 √*½ mk*

1 : 1 : 4

E.F = BaSO4 √*1mk*

1. (a) The outer part (zone) has complete combustion and hence hotter than middle zone forming a charred black part.*√1mk*

Middle part (zone) has incomplete combustion and hence less hot forming unburnt part.√*1mk*

(b) Non-luminousflameis hotter thanluminousflame √*1mk*

Non luminous flame does not produce soot. √*1mk*

√

1. Ro2= 200 = 64

RSo2 60 √*1mk*32

300

t

√

= 200 x t = 2

60 300

30

√

= t = 2 x~~60~~ x 3√*1mk*

~~2~~

= 1.41 x 90

= 127.26sec √*1mk*

1. (i) Methane molecules are held together by weak molecular force of attraction√*½mk* (VanderWaals force) which requires less energy to break / overcome giving methane low B.P.√*½ mk*

Diamond – each carbon atom is bonded to 4 other carbon atoms through very strong√*½ mk* covalent bonds which require a lot of energy to break/overcome giving diamond a very high B.P√*½ mk*

(ii) Ammonia is highly soluble in water and inverted funnel prevents sucking back√*½ mk* and also creates a large surface area for absorption. √*½ mk*

1. (a) Sulphuric acid reacts with marble (calcium carbonate) forming insoluble calcium sulphate √*½ mk*

which forma a coating over marble stopping any further reaction. √½ mk

(b) Oil is less dense√*½ mk* than water making oil to float√*½ mk* on top hence continues to burn.

1. V1 = 4dm3, P1 = 152mmHg ; T1 = -230C

V2 = 2dm3 P2 = ? T2 = 2270C

T1 = -230C + 273 = 250k

T2 = 227 + 273 = 500k

P1V1 = P2V2

T1 T2

152 x 4 = P2 x 2

250 500 √*1mk*

1

~~2~~

P2 = 152 x 4x  ~~500~~

~~250~~ ~~2~~

1 1 = 608mmHg *1mk*

1. a) Aluminium has more delocalized (√*½ mk)* valency electrons hence stronger metallic (*√½ mk)* bonding which requires more energy to break / overcome.

Sodium and magnesium has few delocalized (√ *½ mk)*valency electrons hence weaker metallic (√ *½ mk)* bonding which requires less energy to break /overcome.

b) - Size of the atom / number of energy levels √*1mk*

- Atomic number / number of protons √ *1mk*

*-* Shielding effect √*1mk any 2 x 1 = 2mks*

1. 2XOH(aq) + H2SO4(aq) X2SO4(aq) + 2H2O(l)

15cm3 20cm3

M=? 0.045m

XOH = 2 = 15 x M

H2SO4 1 20 x 0.045 *½ mk*

Therefore M = 2 x 20 x0.045 = 0.12moles / L √*½ mk*

1 x 15

0.12moles / L has 2.88g/L

1 mole = ?

= 2.88 = 24 √*½ mk*

0.12

RFM = 24 √*½ mk*

XOH = 24

X + 16+1 = 24

X =24 - 17 = 7  *RAM of x = 7 √1mk*

1. Calcium carbonate is reacted with dilute nitric acid to form √*½ mk* calcium nitrate, carbon (iv) oxide and water.

CaCO3(g) + 2HNO3(aq) = Ca(NO3)2 (aq) + CO2(g) + H2O(l) *½ mk*

Calcium nitrate is then reacted with dilute sulphuric acid to form calcium sulphate and nitric acid.

Ca(NO3)(aq) + H2SO4(aq) = CaSO4 (aq) + 2HNO3(aq) √*½ mk*

Filtration is then done to obtain calcium sulphate as residue.

The residue is washed with distilled water and dried in the sun or between filter paper.

1. (a) - kerosene

* Diesel
* Petrol
* Gasoline *Any 2 x 1 = 2mks*

(b) - Kerosene – used for cooking*√1mk*

* Diesel – used for diesel engine*√1mk*
* Petrol – used for petrol engine*√1mk*
* Gasoline – used for jet fuel. *√1mk* *Any 2 x 1 = 2mks*

1. (a) 2Cx Hy YCO2 + YH2O

X = 6 = 3

2

Y = 12 = 6

3

M.F.= C3H6 √*½ mk*

H H

Structural formula = C = C C H

H HH √*½ mk*

(b) Alkenes

1. (i) X – Magnesium carbonate √*1mk*

(ii) Y – Magnesium Sulphate √*1mk*

(iii)Z – Carbon (iv) oxide √*1mk*

1. (a) Grey solid – Lead metal √*1mk*

(b) PbO(s) + H2(g) Heat Pb(s) + H2O (l)√*1mk*

(c) 2H2(g) + O2(g) 2H2O(g) √*2mks*

1. CFC’s – Chlorofluoro carbons √*1mk*
2. a) Allotrophy – is the existence of a substance in different forms without change of physical state / existence of an element in more than one form in the same physical state. √*1mk*

b) Graphite - Each carbon atom is bonded to 3 other carbon atoms forming hexagonal layers which are held together by weak Vander Waals force enabling the layers to slide / slip along each other making graphite soft/ greasy. √*2mks*