GOLDEN ELITE EXAMINTIONS 2020

Kenya Certificate of Secondary Education

233/1
CHEMISTRY
PAPER 1
THEORY

MARKING SCHEME

1. (a) $_{20}K$ 2.8.8.2 √*1mk*

   $_{8}M$ 2.6. √*1 mk*

   (b) K 2.8.8.2 $\xrightarrow[2e]{\text{Loose}}$ K^{2+} √*1 mk*

   M 2.6 $\xrightarrow[2\bar{e}]{\text{Gain}}$ M^{2-} √*1 mk*

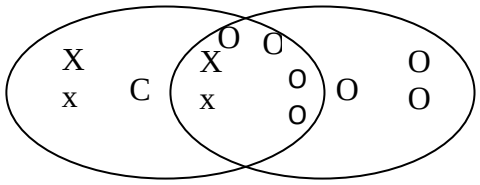
2. (a) Anode
   $2Br^{-}(l) \longrightarrow Br_2(g) + 2\bar{e}$ √*Balmk*
   √*S.S 1 mk*

   (b) Cathode
   $Pb_{(l)}^{2+} + 2\bar{e} \longrightarrow Pb(s)$ √*1 mk*

3. 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*

4. Z Y X √*1 mk*
   Decreasing order

5. 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*
6. (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*
7. (a) B- Lie berg condenser.√*1mk*
   (b) Thermometer – To maintain the temperature for distillation. √*1mk*
   (c) Liquid C√*1mk*

8. 

√2mks

9. (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 100^0C and melting point 0^0C 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*

10. (a) Remove / absorb carbon (iv) oxide √1mk
(b) $3Mg_{(s)} + N_{2(g)} \xrightarrow{Heat} Mg_3N_{2(s)}$ √1mk
(c) Neon / Argon √1mk
- Are inert gases / unreactive gases and therefore do not react with magnesium. √1mk

11. (a) But - I - ene √1mk
(b) Pent – 2 – ene √1mk

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

13. (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

14.

Element	Ba	S	O	
% Composition	58.81	13.72	24.47	
RAM	137.0	32.0	16.0	
No. of Moles	58.81 / 137	13.72 / 32	24.47 / 16	√½ mk
=	0.4293	0.4281	1.7168	
Simplest ratio	0.4293 / 0.4281	0.4281 / 0.4281	1.7168 / 0.4281	√½ mk
	1 :	1 :	4	

E.F = $BaSO_4$ √1mk

15. (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

16. $\frac{Ro_2}{RSo_2} = \frac{200}{60}$ √1mk $= \sqrt{\frac{64}{32}}$

$$\frac{300}{t}$$

$$= \frac{\cancel{200}}{\cancel{60}} \times \frac{t}{\cancel{300}} = \sqrt{2}$$

$$30$$

$$= t = \sqrt{\frac{2 \times \cancel{60} \times 3}{\cancel{2}}} \surd 1mk$$

$$= 1.41 \times 90$$

$$= 127.26sec \quad \surd 1mk$$

17. (i) Methane molecules are held together by weak molecular force of attraction $\surd$½*mk* (VanderWaals force) which requires less energy to break / overcome giving methane low B.P. $\surd$½ *mk*
Diamond – each carbon atom is bonded to 4 other carbon atoms through very strong $\surd$½ *mk* covalent bonds which require a lot of energy to break/overcome giving diamond a very high B.P $\surd$½ *mk*
(ii) Ammonia is highly soluble in water and inverted funnel prevents sucking back $\surd$½ *mk* and also creates a large surface area for absorption. $\surd$½ *mk*

18. (a) Sulphuric acid reacts with marble (calcium carbonate) forming insoluble calcium sulphate $\surd$½ *mk* which forma a coating over marble stopping any further reaction. $\surd$½ mk
(b) Oil is less dense $\surd$½ *mk* than water making oil to float $\surd$½ *mk* on top hence continues to burn.

19. $V_1 = 4dm^3$, $P_1 = 152mmHg$; $T_1 = -23^0C$

$V_2 = 2dm^3$ $P_2 = ?$ $T_2 = 227^0C$

$T_1 = -23^0C + 273 = 250k$
$T_2 = 227 + 273 = 500k$

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

$$\frac{152 \times 4}{250} = \frac{P_2 \times 2}{500} \quad \surd 1mk$$

$$P_2 = \frac{152 \times 4 \times \overset{1}{\cancel{500}}}{\cancel{250} \quad \cancel{2}_{\,1}} = 608mmHg \quad 1mk$$

20. a) Aluminium has more delocalized ($\surd$½ *mk)* valency electrons hence stronger metallic ($\surd$½ *mk)* bonding which requires more energy to break / overcome.
Sodium and magnesium has few delocalized ($\surd$ ½ *mk)*valency electrons hence weaker metallic ($\surd$ ½ *mk)* bonding which requires less energy to break /overcome.
b) - Size of the atom / number of energy levels $\surd$*1mk*
- Atomic number / number of protons $\surd$ *1mk*
- Shielding effect $\surd$*1mk* *any 2 x 1 = 2mks*

21. $2XOH(aq) + H_2SO_4(aq) \longrightarrow X_2SO_4(aq) + 2H_2O(l)$

$15cm^3$ $20cm^3$
M=? 0.045m

$\frac{XOH}{H_2SO_4} = \frac{2}{1} = \frac{15 \times M}{20 \times 0.045}$ *½ mk*

Therefore $M = \frac{2 \times 20 \times 0.045}{1 \times 15} = 0.12$moles / L √*½ mk*

0.12moles / L ~~has 2.88~~g/L
1 mole = ?
$= \frac{2.88}{0.12} = 24$ √*½ mk*
RFM = 24 √*½ mk*
XOH = 24
X + 16+1 = 24
X =24 - 17 = 7 *RAM of x = 7* √*1mk*

22. Calcium carbonate is reacted with dilute nitric acid to form √*½ mk* calcium nitrate, carbon (iv) oxide and water.
$CaCO_3(g) + 2HNO_3(aq) = Ca(NO_3)_2(aq) + CO_2(g) + H_2O(l)$ *½ mk*
Calcium nitrate is then reacted with dilute sulphuric acid to form calcium sulphate and nitric acid.
$Ca(NO_3)(aq) + H_2SO_4(aq) = CaSO_4(aq) + 2HNO_3(aq)$ √*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.

23. (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*

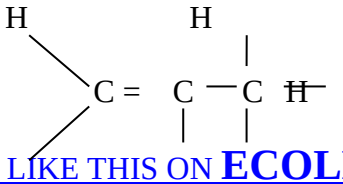
24. (a) $2C_xH_y \longrightarrow \sim\!\!\!\rightarrow YCO_2 + YH_2O$

$X = \frac{6}{2} = 3$

$Y = \frac{12}{3} = 6$

M.F.= C_3H_6 √*½ mk*

Structural formula =



H HH √½ *mk*

(b) Alkenes

25. (i) X – Magnesium carbonate √*1mk*
(ii) Y – Magnesium Sulphate √*1mk*
(iii)Z – Carbon (iv) oxide √*1mk*

26. (a) Grey solid – Lead metal √*1mk*
(b) $PbO_{(s)} + H_{2(g)} \xrightarrow{Heat} Pb_{(s)} + H_2O_{(l)}$ √*1mk*
(c) $2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(g)}$ √*2mks*

27. CFC's – Chlorofluoro carbons √*1mk*

28. 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*