

GATUNDU SOUTH JOINT EXAM
Certificate of Secondary Education

Kenya

CHEMISTRY PAPER 1
JULY/AUGUST 2019

MARKING SCHEME

1. (i) P – Hexane (1mk)
 (ii) W – Water (1mk)
2. To separate samples of CUO and charcoal in test tubes, dilute mineral (^{1/2mk}) acid is added with shaking CUO dissolves to form blue solution (^{1/2mk}) charcoal does not dissolve in dilute mineral acids (1mk)
3. i. Range of boiling points / no sharp boiling points (1mk)
- ii. Carry out fractional distillation (1mk)
4. - As a fuel (2mks)
 - As a reducing agent
5. a) Anhydrous calcium chloride (1mk)
 Drying agent (1mk)
- b) $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$
6. - Because aluminium has more delocalized electrons (1mk) than magnesium.
 - It does not corrode------(1mk)
7. - Chlorine bleaches by oxidation while sulphur (iv) oxide bleaches by reduction. (1mk)
 - Bleaching by Chlorine is permanent, bleaching by sulphur (iv) oxide is not permanent. (1mk)
8. i) Excess carbon (iv) oxide
 Dilute hydrochloric acid
- ii) $\text{Mg}(\text{HCO}_3)_2(\text{aq}) \rightarrow \text{MgCO}_3(\text{s}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$
 $\text{Mg}(\text{HCO}_3)_2(\text{aq}) \rightarrow \text{MgO}(\text{s}) + 2\text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
- iii) Add sodium carbonate/any soluble carbonate (named) solution; (1mk)
 Filter (^{1/2mk})
 Dry the residue between two filter papers (^{1/2mk})
9. a) A (1mk)
 It does not form scum/insoluble salt with calcium ions. (1mk)
- b) A (1mk)
10. a) The rate of diffusion of a gas is inversely proportional to the square root of its density under the same conditions of temperature and pressure.
- b) $T_1 = M_1 \sqrt{\frac{100}{\quad}} = \frac{32}{\quad} \sqrt{\quad}$ (1mk)

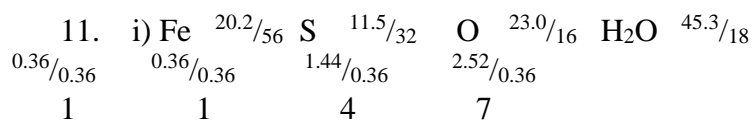
$$T_2 \propto \sqrt{M_2} \quad T_2 \propto \sqrt{64}$$

for 240cm^3 $T_2 = 100 \frac{64}{32}$

$$= 141.42 \text{ sec} \quad (1\text{mk})$$

for 300cm^3 $\frac{141.42 \times 300}{240}$

$$= 176.78 \text{ sec} \quad (1\text{mk})$$



Empirical formula: $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

ii) $6.95\text{g} = \frac{6.95}{278} = 0.025$

❖ $0.05 \text{ moles in } 250\text{cm}^3 = 0.025 \times \frac{1000}{250} = 0.1$

12. a) Cracking/catalytic decomposition (1mk)

b) – Increasing volume of hydrocarbons (1mk)

- Producing Hydrogen in industries/source of Alkene
- Lowering the Octane-rating

c) – Acidified potassium Manganate (vii) (1mk)

- Bromine water.

13. a) ${}^0_0\text{e}$ reject beta particle (1mk)

b) $\frac{1}{32} = (\frac{1}{2})^n$ (1mk)

$(\frac{1}{2})^5 = (\frac{1}{2})^n$, $n = 5$ (1mk)

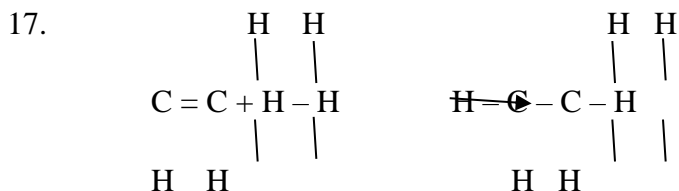
One half-life = $\frac{150}{5} = 30\text{days}$ (1mk)

14. i) X – Rhombic (1/2mk)
 Y – Monoclinic (1/2mk)
 ii) -Mg has a higher affinity for combined oxygen than S. (1mk)
 - Mg produces a lot of heat which decomposes SO₂ into S and oxygen. Oxygen gas support combustion. (1mk)
 15. Add 100cm³ of 2M potassium hydroxide or 200cm³ of 1M potassium hydroxide to the acid. (1mk)

Heat the solution until it is saturated (1mk), cool to obtain crystals (1/2mk). Dry crystals between filter papers (1/2mk)

16. 255g of solution cooled, give 124g crystals
 50g of solution cooled to give ?

$$\frac{50 \times 124}{255} = 24.314g \quad (2mks)$$



Bond breaking

$$4 \text{ C} - \text{H}, 4 \times 410 = 1640$$

$$\text{C} = \text{C}, 1 \times 610 = 610$$

$$\text{H} - \text{H}, 1 \times 436 = 436$$

$$\underline{2686} \quad (1mk)$$

$$\text{H} = 2 \times 86 - 2805$$

$$= -119 \text{ KJ/Mol} \quad (1mk)$$

Bond formation

$$6 \text{ C} - \text{H} \quad 6 \times 410$$

$$2460$$

$$\text{C} - \text{C} \quad \underline{345}$$

$$\underline{2805}$$

(1mk)

18. i) will increase (1mk)

- ii) Decrease (1mk)

19. i) $200 \times 58 \times 60 \text{ C} \quad \underline{\hspace{2cm}} \quad 64.8g \quad (1/2mk)$

$9500 \text{ C} \quad \underline{\hspace{2cm}} \quad 27g \quad (1/2mk)$

$$\frac{27 \times 200 \times 58 \times 60}{64.8 \times 96500} \quad (1/2mk)$$

$$\underline{\hspace{2cm}}$$

- ii) $40\text{H} \text{ (g)} \quad \underline{\hspace{2cm}} \quad 2\text{H}_2\text{O} \text{ (l)} + \text{O}_2 \text{ (g)} + 4\text{e}^- \quad (1/2mk)$

$4 \times 96500 \quad \underline{\hspace{2cm}} \quad 22.4\text{dm}^3 \quad (1/2mk)$

$$\frac{200 \times 58 \times 60 \times 22.4}{4 \times 96500 \text{ C}} \quad \underline{\hspace{2cm}}$$

20. a) $\text{Mg}_{(s)} + \text{Pb}^{2+}_{(aq)} \xrightarrow{=40.39\text{dm}^3 (1/2\text{mk})} \text{Mg}^{2+}_{(aq)} + \text{Pb}_{(s)}$
(1mk)
- b) $0.13 - (-0.76)$ (1mk)
 $= +0.53\text{V}$ (1mk)
21. a) Chlorofluorocarbons// Chlorofluorohydrocarbons// Organic compounds that contains Chlorine and Fluorine (1mk)
- b) – Freons (1mk)
- Aerosols/ sprays
- c) Causes depletion of the ozone (1mk)
22. a) Nitrogen (1mk)
- b) $3\text{CuO}_{(s)} + 2\text{NH}_3_{(g)} \xrightarrow{\quad} 3\text{Cu}_{(s)} + 3\text{H}_2\text{O}_{(l)} + \text{N}_2_{(g)}$ (1mk)
- c) – Colour change from black to brown (1mk)
- Droplets of colourless liquid formed on the cooler parts of combustion tube.
23. a) Oxidation (1mk)
- b) Propanol forms hydrogen bonds with water propane remains in molecular form. (2mks)
24. i) Presence of unburnt gases in the almost colourless region of a Bunsen burner flame. (1mk)
- ii) Non-luminous (1mk)
- iii) – Very hot (1mk)
- Pale blue
- Short and steady
- Burns with a noise
- Doesn't produce soot.
25. a) NaCl don't undergo hydrolysis in water, AlCl_3 undergoes hydrolysis forming $\text{HCl}_{(aq)}$ (2mks)
- b) Aluminium Chloride exists as a dimer Al_2Cl_3 when it sublimes at 183°C . (1mk)
26. i) $X + 3(-2) = -2$
 $X = +4$ (1mk)
2.8.2 (1/2mk)
- ii) $X + 3(-2) = 0$
 $X = 6$ (1mk)
2.8 (1/2mk)
27. a) Substance that shows a definite colour-in acid and another definite colour in bases. (1mk)

b) Universal indicator gives information on the strength of an acid or base, but acid base indicator only shows whether a substance is an acid or a base. (2mks)

28. i) To lower melting point of ice hence helps to defrost the roads. (1mk)

ii) Salt accelerates the rate of rusts. (1mk)

29. a) NaOCl (1mk)

b) $\text{NaOCl}_{(aq)} + \text{Dye}_{\text{coloured}} \longrightarrow \text{NaCl}_{(aq)} + [\text{Dye} + \text{O}]_{\text{white}}$ (1mk)