

NTIMA, NYAKI AND MUNICIPALITY CLUSTER EVALUATION - 2016
Kenya Certificate of Secondary Education
CHEMISTRY
Paper - 233/1
July/August 2016
Marking Scheme

1. Can be separated by physical means. ✓1
2. Sulphuric dissociates completely ✓1 in water to form many ions ✓½ while Ethanoic acid dissociates partially ✓1 to give fewer ✓1 ions.
NB- Awards 1 mark for sulphuric acid is strong acid and Ethanoic acid weak.
3. a) A// 1.0 ✓1 Acc. 2// B
b) C // 6.0 ✓1
c) Effervescence occurs ✓1 // bubbles of colourless gas.
4. a) P - 2.8.6 ✓½
Q - 2.8.8.2 ✓½
b) i) Molecular structure ✓1
ii) Giant ionic structure ✓1 for Q
5. a) Magnesium is A ✓1
- Solution B is any soluble salt of copper ✓1
6. i) Hydrogenation ✓1
ii) Nickel catalyst ✓½
- Temperature of 150°C - 250°C ✓½
NB: The two must be correct
iii) Manufacture of margarine ✓1 / hardening of oil.
- 7.- Add excess ✓½ lead carbonate to the dilute Nitric (V) acid until effervescence stops.
- Filter ✓½ the unreacted lead (II) carbonate.
- Add ✓½ excess dilute hydrochloric acid to the filtrate ✓½ and filter / again. (Reject Add dilute HCl to lead carbonate)
8. Equation



$$\text{Moles of Na}_2\text{CO}_3 = \frac{0.2 \times 25}{1000} = 0.005 \text{ moles}$$

$$\text{Volume of Na}_2\text{CO}_{3(aq)} = \frac{1}{2} \times 0.005 = 0.0025 \text{ moles}$$

- 9.i) White ppts ✓½ formed which dissolve ✓½ forming a colourless ✓½ solution.
The white ppt is insoluble ✓½ calcium carbonate which dissolves due to the formation of soluble ✓½ calcium hydrogen carbonate.

ii) Any of noble gases ✓1

| | | |
|---|------------------------|------------------------|
| 10. Anions | SO_4^{2-} | SO_4^{2-} |
| $\text{Ba}(\text{NO}_3)_2(aq)$ | White ppt ✓½ | White ppts ✓½ |
| $\text{Ba}(\text{NO}_3)_2$ and $\text{HNO}_3(aq)$ | White ppt ✓½ dissolves | White ppt ✓½ insoluble |

- 11.a) Diamond has strong covalent bond which are uniformly distributed throughout the structure, forming tetrahedron pattern (w.t.t.e)

- b) Graphite has hexagonal layers ✓½ which are joined together by weak Van der Waals ✓½ forces hence slippery. ✓1 (w.t.t.e)

12. At A a gray deposit of lead metal. ✓½ Lead ions are reduced to lead metal. ✓1

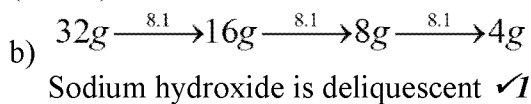
At B₁ Brown vapour ✓½
Bromide ions are oxidised to bromine gas ✓1

13. i) , Has shorter half-life ✓½

ii)

$$3 \times 8.1 = 24.3 \text{ days } \checkmark$$

14. a) To prevent flow back of the steam that condenses which might crack the flask (w.t.t.e) ✓1

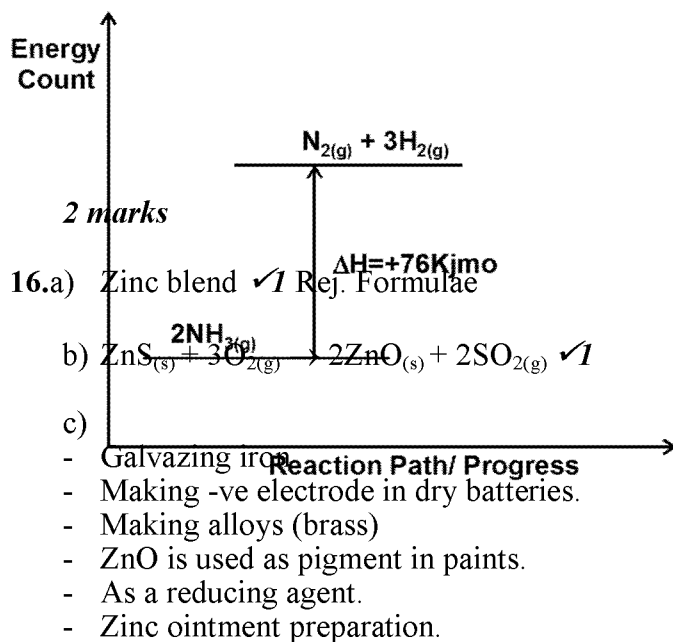
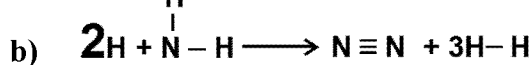


- c) Calcium oxide // CaO // Quicklime ✓1

15.

Bond breaking energies = $388 \times 6 = +232\text{kJ}$ ✓½
Bond formation energy = $944 + (3 \times 436) = 252\text{kJ}$

✓1
 $2328 - 2552 = +76\text{kJ/mol}$ ✓1



17. i) Dilute sulphuric (VI) acid ✓1

- ii) B - hydrogen gas ✓1

- b) Black copper (II) oxide turns to brown ✓1

18. A - Green copper (II) carbonate turns to black.

- B - No white ppt formed ✓1

ii)

19.

20.

- i) Non-luminous flame ✓1
ii) Lower part of the flame ✓1
iii) Piece of white paper ✓1

21.

| Experiment (III) | Observation | Explanation |
|------------------|---------------------------|---|
| b) 1 | Litmus solution turns red | HCl(g) ionises to form H ⁺ ion |
| iii) 2 | NO effervescence occurs | HCl(g) does not ionise in |

- a) Noble gases ✓1

- b) Al has higher mpts than Na ✓1
Al has more delocalised electrons ✓½ hence stronger metallic ✓½ bond than sodium.

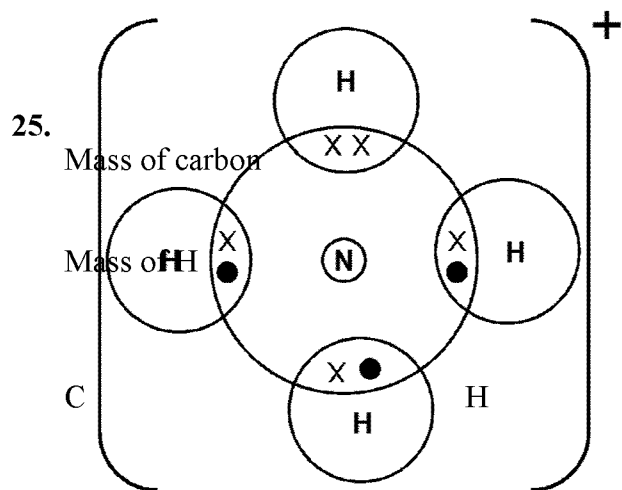
23.

- a)- Monoclinic sulphur ✓1
- Rhombic sulphur
 $\text{Fe}_{(s)} + 3\text{Cl}_{2(g)} \rightarrow 2\text{FeCl}_{3(s)}$

- b)- Colloidal sulphur ✓1
- Powdered sulphur
- Plastic ✓1

- c) Has low mpts ✓1
does not dissolve in water

24.



c) Fractional distillation ✓1

$$\text{RMM} = \frac{12}{44} \times 1.572 = 0.4287 \text{ g} \quad \checkmark_{1/2}$$

$$= \frac{2}{18} \times 0.6442 = 0.0715 \text{ g} \quad \checkmark_{1/2}$$

26. a) $\frac{0.4287}{0.0357} = 12.01$ ✓1/2
 b) Esters ✓1
 c) Biodegradable hence less environmental pollution. ✓1

27. a) The rate of diffusion of a gas is inversely proportional to the square root of its density at constant temperature and pressure. ✓1

b) i) $\frac{0.5 \times 22400}{160} = 70$ ✓1/2

ii) Near $(\text{CH}_3)_2\text{N}_2\text{O}$ ✓1

28. $\frac{14n}{14} = \frac{70}{14} = 5$

i) Hydrogen sulphide ✓1/2
 It has donated electrons to chlorine ✓1

ii) A yellow deposit of sulphur ✓1

29.

a) Distillation ✓1

b) Sublimation ✓1

