

KCSE TRIAL 2020

CHEMISTRY PAPER 1

1. (a). Under what condition does the Bunsen burner produce luminous flame? (1 mark)

(b). Luminous flame is yellow and sooty. Explain. (2 marks)

2. (a). Distinguish between isotopes and allotropes (2 marks)

(b). Name one allotrope of Sulphur that is stable at temperature above 96°C (1 mark)

3. Sodium metal burns with a yellow flame in excess oxygen forming yellow solid. The yellow solid react with water to form gas F.

(a). Name the yellow solid (1 mark)

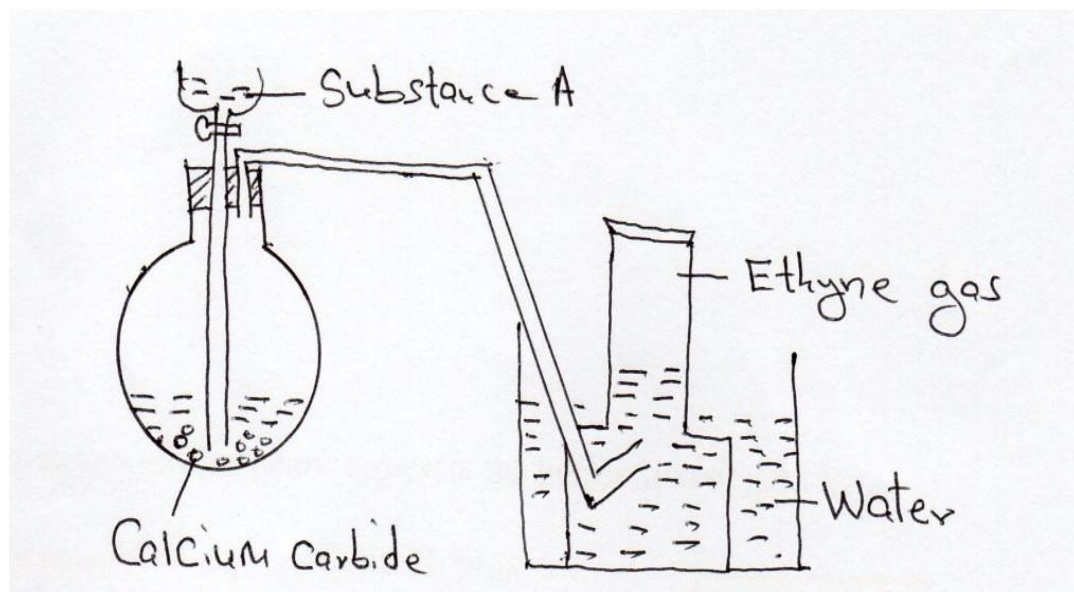
(b). Identify gas F (1 mark)

(c). Write an equation for the reaction of the yellow solid with water. (1 mark)

4. (a). State Boyle's law. (1 mark)

(b). Explain why the pressure of a fixed mass of a gas increases with increase in temperature in a fixed volume container. (2 marks)

5. The set up in figure 1 can be used to prepare ethyne gas. Use it to answer the questions that follow.



[a]. Name substance A (1 mark)

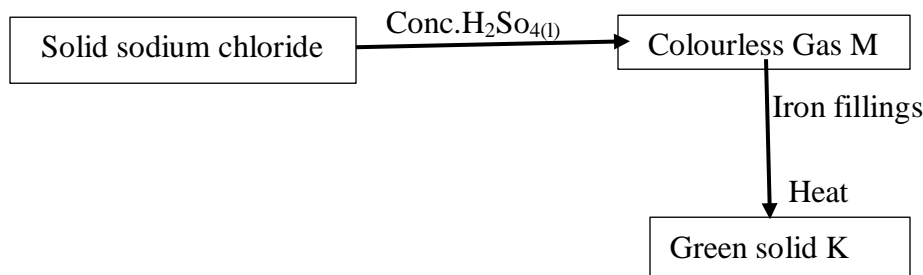
[b]. Write an equation for the reaction which occurred in the flask (1 mark)

(c). Draw and name the structure of the compound formed when one mole of ethyne reacts with one mole of chlorine gas. (1 mark)

6. Starting with zinc carbonate solid describe how zinc hydroxide can be prepared in the laboratory. (3 marks)

7. 24.0cm^3 of 0.18M hydrochloric acid was added to 0.38g of sodium carbonate solid. Calculate the mass of sodium carbonate that did not react. ($\text{O}=16$, $\text{Na}=23$ $\text{C}=12$) (3 marks)

8. The reaction scheme below represent the preparation of gas M.



[a]. Identify gas M and solid K

Gas M _____ ($\frac{1}{2}$ mark)

Green solid K _____ ($\frac{1}{2}$ mark)

[b]. Describe a chemical test for gas M (2 marks)

9. (a). 0.95g of Magnesium Chloride was dissolved in 250cm^3 of water. Calculate the molar concentration of Chloride ions in the solution. ($\text{Mg}=24$ $\text{Cl}=35.5$) (3 marks)

10. (a). What is an acid-base indicator? (1 mark)

(b). Describe how the pH of a soil sample can be determined in the laboratory. (2 marks)

11. In an experiment, Hydrogen sulphide gas was bubbled into a solution of iron (III) chloride. State and explain the observations made. (3 marks)

12. The diagram below represents part of the periodic table. Use it to answer the questions that follow. The letters are not the actual symbols of the elements. (2 marks)

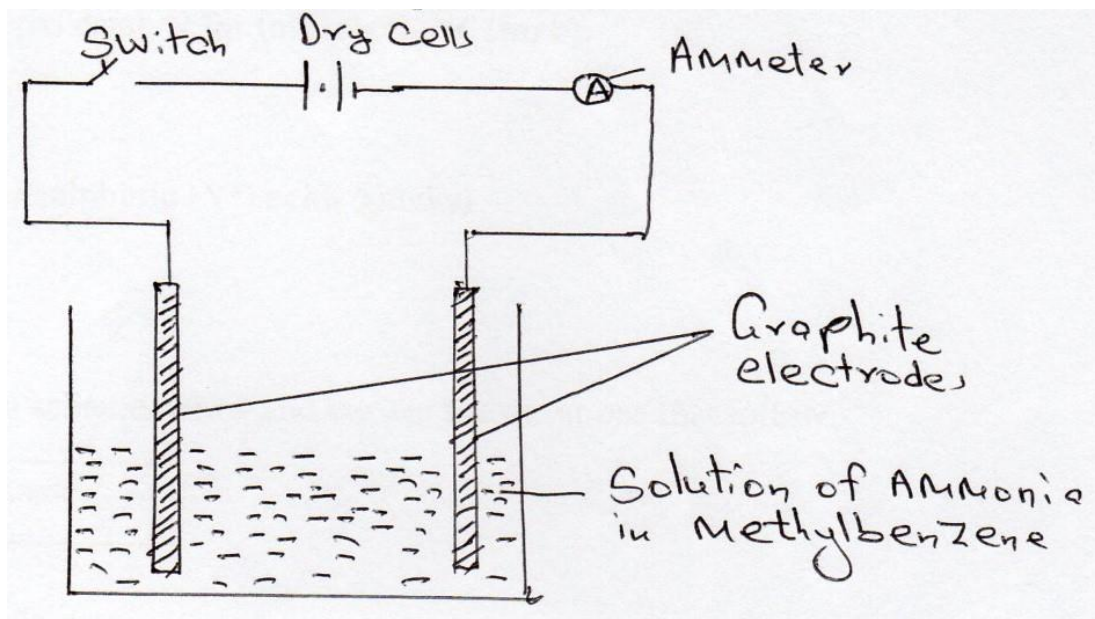
M					Q		
T	V			W			

(a). Write the Electronic arrangement for the stable ion formed by **M**. (1 mark)

(b). Write an equation for the reaction between T and **Q**. (1 mark)

(c). Compare the melting point of element T and V. (1 mark)

13. Study the set-up below and answer the questions that follow.



State and explain the observation made when the switch is closed. (2 marks)

14. (a). Define molar heat of combustion. (1 mark)

(b). X g of element Q was completely burned in air. The heat evolved was used to heat 250cm^3 of water. The temperature of water rose from 32°C to 50°C . Molar heat of combustion of element Q is -360kJmol^{-1} . Calculate the value of X. (Density of water is 1gcm^{-3} and specific heat capacity of water is 4.2kJ mol^{-3} R.A.M of Q=24) (2 marks)

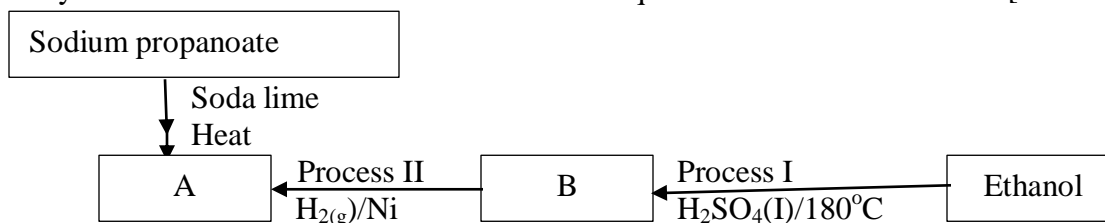
15. A sample of water is suspected to contain chloride ions. Describe an experiment that can be carried out to determine the presence of chloride ions. (3 marks)

16. In contact process, Sulphur (IV) oxide reacts with oxygen to form Sulphur (VI) oxide in presence of a catalyst.

(a). Name the preferred catalyst for this reaction. (1 mark)

(b). Give two uses of sulphuric (VI) acid (2 marks)

17. Study the reaction scheme below and answer the questions that follow. [1 mark]



a). Identify substances (1 mark)

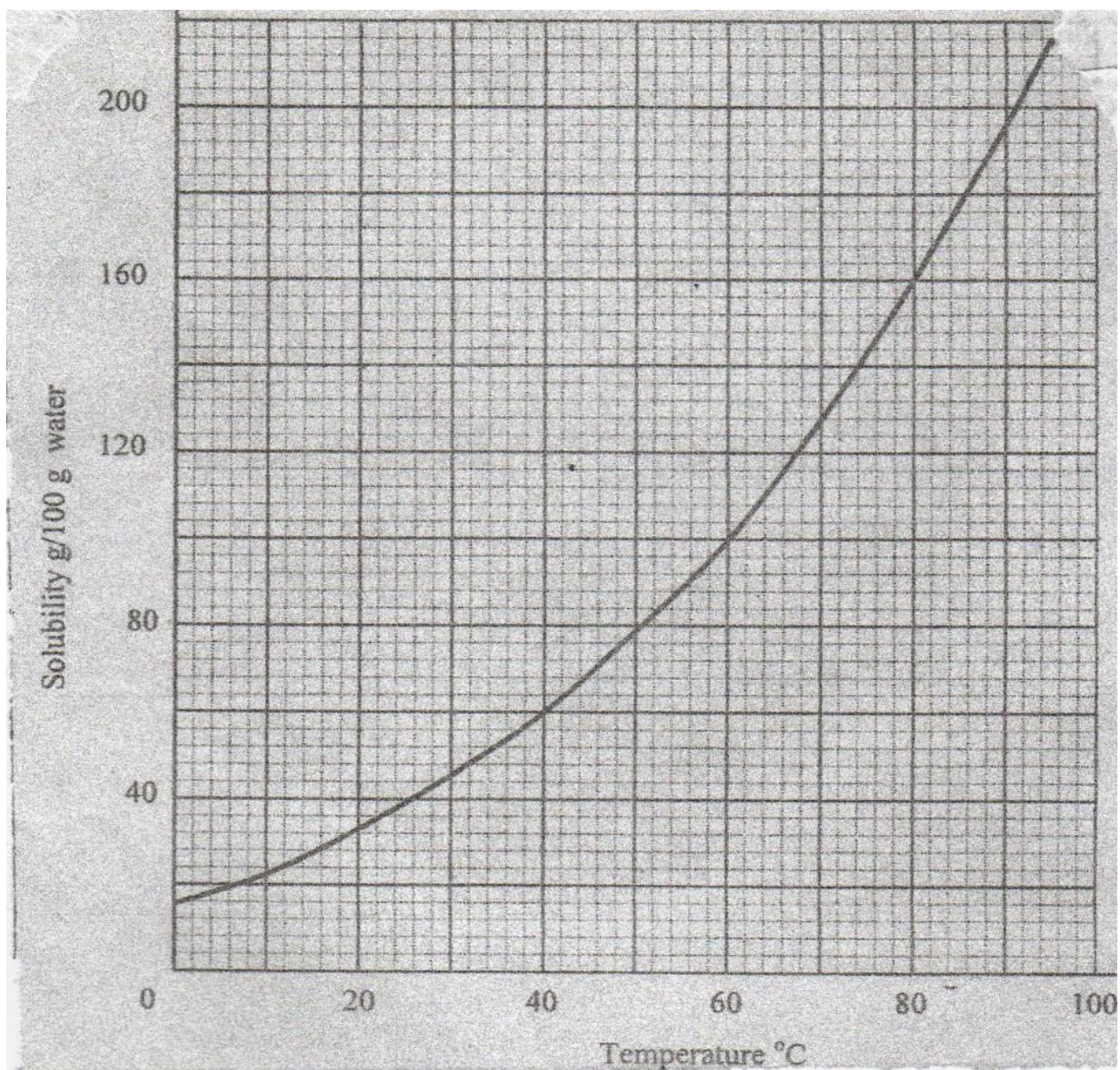
A-

B-

[b]. Name process I (1 mark)

(c). Name the substance produced when Sodium Propanoate react with Soda lime. (1 mark)

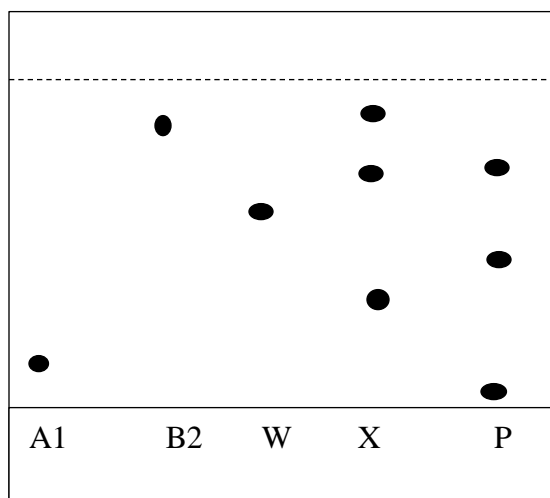
18. The solubility curve of potassium nitrate is shown below.



[a]. Determine the solubility of potassium nitrate at 40°C (1 mark)

[b]. Determine the molar concentration of saturated potassium nitrate at 40°C
 (K = 39.0, O = 16.0 N = 14.0 and density of water 1g/cm³) (2 marks)

19. Sample of urine from three participants W, X and P at an international sports meeting were spotted onto a chromatography paper alongside two from illegal drugs, A₁ B₂. A Chromatogram was run using methanol. The figure below shows the chromatogram.



(a). Identify the athlete who had used an illegal drug. (1 mark)

(b). Which drug is more soluble in methanol. Give a reason. (2 marks)

20. State and explain the change in mass that occur when the following substances are separately heated in open crucibles.

(a). Magnesium ribbon (1 mark)

(b). Sodium carbonate (1 mark)

21. With the help of a well labeled diagram, draw a set-up of an arrangement of assembled apparatus that can be used to prepare dry hydrogen gas, including the appropriate reagents.

(3 marks)

22. Dry carbon (II) oxide gas was passed over heated lead (II) oxide.

(a). Write an equation for the reaction. (1 mark)

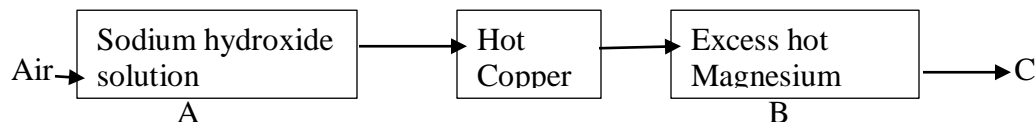
(b). Give one industrial application of the above reaction. (1 mark)

23. A student burnt magnesium ribbon in a gas jar full of Sulphur (IV) oxide gas

(i). State two observations made in the gas jar. (2 marks)

(ii). Write an equation for the reaction that took place. (1 mark)

24. Air was passed through reagent as shown below.



(i). State the role of sodium hydroxide solution. (1 mark)

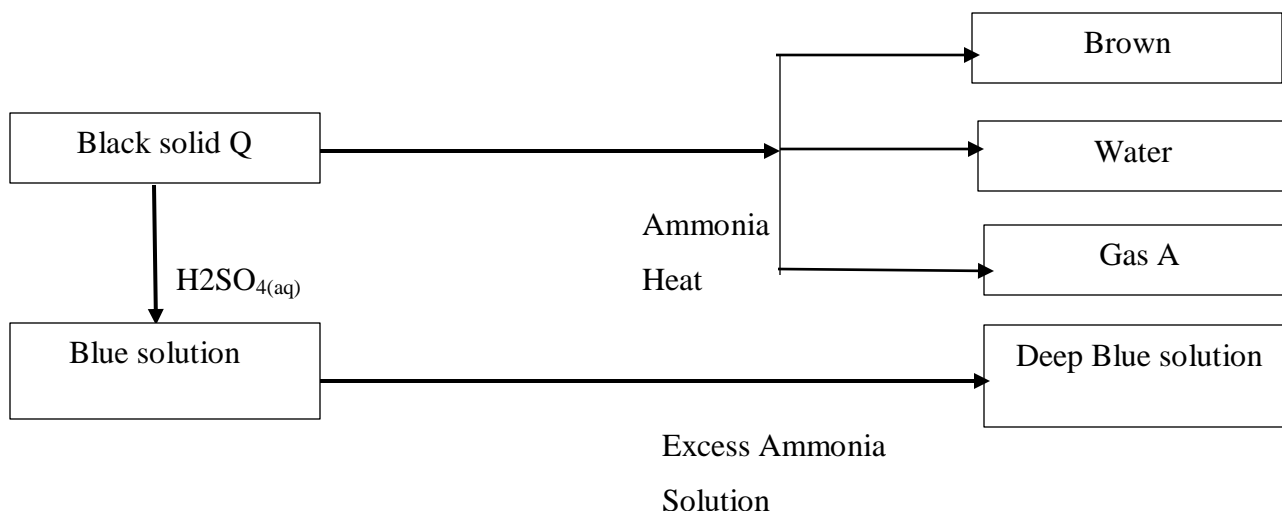
(ii). Name one component in C. Explain. (1 mark)

25. Analysis of a compound showed that it had the following composition. 69.42% Carbon, 4.13% Hydrogen and the rest Oxygen

Determine the empirical formula of the compounds. (3 marks)

(C=12.0, H=1.0, O=16.0)

26. Study the reaction scheme below and answer the questions that follow. (1 mark)



(a). Identify

i. Black solid Q (1 mark)

ii. Gas A (1 mark)

(b). Write an equation for the reaction between ammonia and black solid Q. (1 mark)

(c). Write the formula of the complex ion in deep blue solution. (1 mark)

27. Element **S** has an atomic number of 14 and **R** has an atomic number of 17

(a). Write the formula of the ion of element S. (1 mark)

(b). Using dot (.) and cross (x) diagrams show how **S** and **R** combine to form a compound. (2 marks)

28. Explain why the following substances conduct an electric current.

(a). Aluminium metal

(1 mark)

(b). Molten magnesium chloride

(1 mark)
