

NAME..... INDEX NO.....

CANDIDATE'S SIGNATURE.....

DATE.....

233/1
CHEMISTRY (THEORY)
PAPER 1
JULY/AUGUST 2011
TIME: 2 HRS.

NANDI EAST, NANDI SOUTH AND TINDIRET DISTRICTS JOINT EXAMINATION 2011

Kenya Certificate of Secondary Education
CHEMISTRY PAPER 1 (THEORY)
TIME: 2 HRS.

INSTRUCTIONS TO CANDIDATES:

Write your **Name** and **Index Number** in spaces provided **above**.

Sign and write the date of examination in the spaces provided **above**.

Answer **ALL** the questions in the spaces provided.

Mathematical tables and electronic calculators **may be** used.

All working **must be** clearly shown where necessary.

FOR EXAMINER'S USE ONLY

Questions	Maximum Score	Candidate's Score
1 – 29	80	

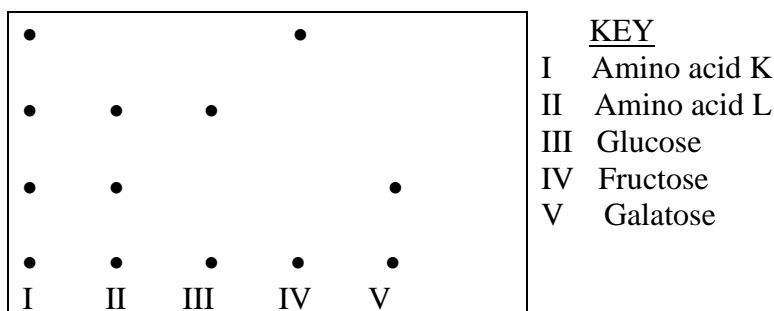
1. The table below gives information on four elements by letters **K**, **L**, **M**, and **N**. Study it and answer the questions that follow. The letters do not represent the actual symbols of the elements.

Elements	Electron arrangement	Atomic radius (nm)	Ionic radius (nm)
K	2.8.2	0.136	0.065
L	2.8.7	0.099	0.181
M	2.8.8.1	0.203	0.133
N	2.8.8.2	0.174	0.099

- (a) Which **two** elements are in the same group? Explain. (2mks)

- (b) Which element is the strongest reducing agent? (1mk)

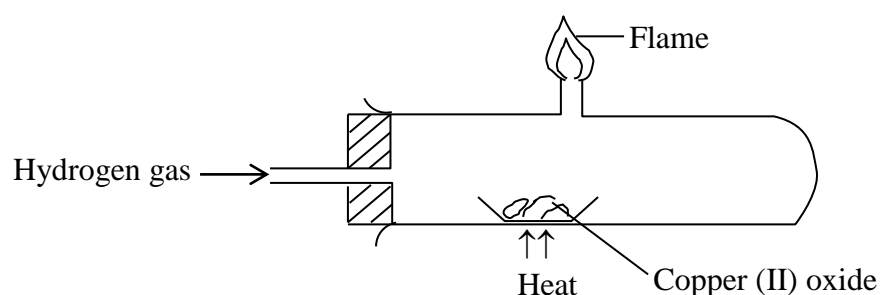
2. Amino acids **K** and **L** were found to be pure compounds. A chromatogram of these amino acids of **K** and **L** and also of three sugars: glucose, fructose and galactose was made with the results shown below.



- (a) What **two** simple sugars must be present in powder **K** and **L**. (1mk)

- (b) Indicate the solvent front and the origin on the diagram above. (2mks)

3. Study the figure below and answer the questions that follow:



(a) Write the equation for the reaction taking place in the test tube. (1mk)

(b) Why should hydrogen be passed over copper (II) oxide for sometime before heating starts? (1mk)

(c) State the observation made at the end of the experiment. (1mk)

4. Using dots (.) and crosses (x) show the bonding in ammonium radical. (N = 7.0, H = 1.0) (2mks)

5. The equation below shows the preparation of a bleaching agent, (sodium hypochlorite) in which excess chlorine was bubbled into 30 moles of sodium hydroxide.

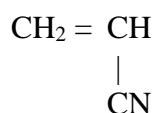


Calculate the mass in kilogram of sodium hypochlorite produced. (Na = 23, Cl = 35.5, O = 16) (2mks)

6. (a) State the Boyle's law. (1mk)

- (b) The pressure of a 200cm³ nitrogen gas of a certain gas is 740mmHg. Calculate the pressure of the same gas when the volume increased by 100cm³. (2mks)

7. A monomer has the structure shown below.



- (a) Draw the structure of its polymer. (1mk)

- (b) A sample of the polymer formed from the monomer has a molecular mass of 4134. Determine the number of monomers making up the polymer. (H = 1, C = 12, N = 14) (2mks)

8. The equation below shows the conversion of sulphur (IV) oxide to sulphur (VI) oxide in the contact process.

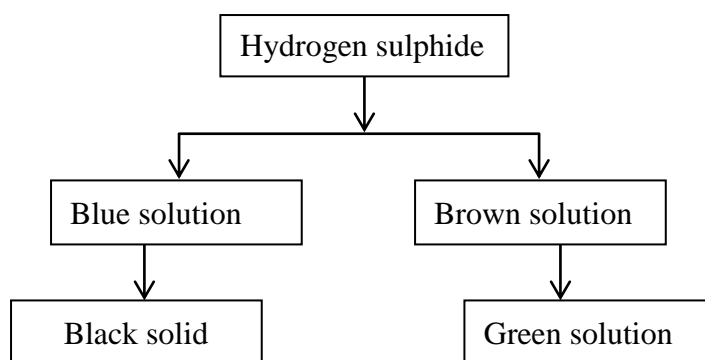


- (a) State the effect of increasing pressure on the position of the equilibrium. (2mks)

(b) Name the catalyst used in this process. (1mk)

9. Describe how a solid sample of calcium sulphate can be prepared using the following reagents, dilute nitric acid, dilute sulphuric acid and solid calcium carbonate. (3mks)

10. Hydrogen sulphide was bubbled into solutions of metallic nitrates as represented in the flowchart below.



(a) Identify: (2mks)

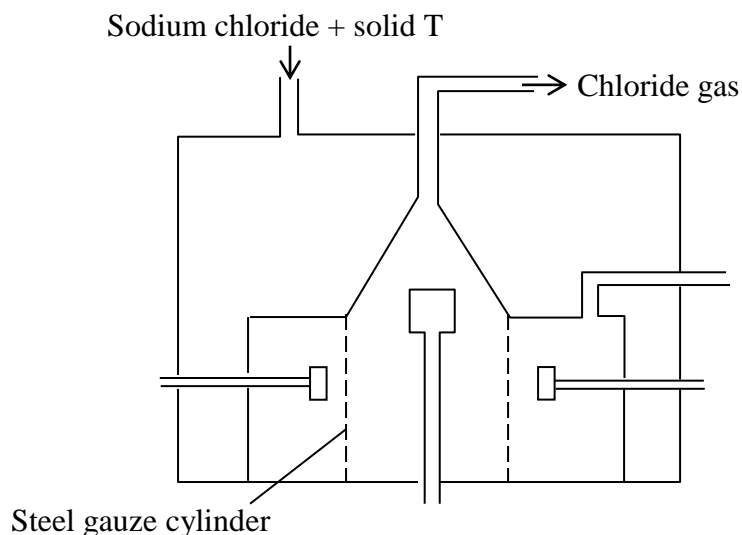
Black solid: _____

Green solution: _____

(b) Write ionic equation for the formation of the black solid. (1mk)

11. A compound was found to contain 40.91% carbon, 4.55% hydrogen and the rest oxygen. Determine its empirical formula. (C = 12.0, O = 16.0, H = 1.0) (3mks)

12. The diagram below represents the down cell used in the extraction of sodium metal. Study it and use it to answer the questions that follow.



- (a) Solid T is meant to lower the melting point of sodium chloride. Name it. (½mk)

- (b) What is the function of the steel gauze cylinder. (½mk)

- (c) Write equations for the reactions that takes place at the:

- (i) Anode: (1mk)

- (ii) Cathode: (1mk)

13. Explain briefly how you would obtain crystals of sodium chloride from a mixture of sodium chloride, lead (II) chloride and iron fillings. (3mks)

14. The molecular formula of a hydrocarbon is C_6H_{14} . The hydrocarbon can be converted into two other hydrocarbons as shown below.



- (a) What name is given to the process taking place above? (1mk)

- (b) Draw the possible structure of X. (1mk)

- (c) State the observation that would be made if a few drops of bromine water were added to a sample of X. (1mk)

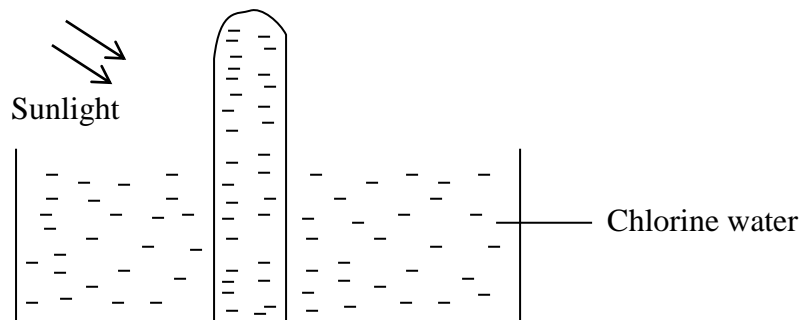
15. An element T consists of two isotopes ^{62}T and ^{64}T in the ratio 7:3 respectively. Calculate the relative atomic mass of element T. (2mks)

16. Write the formula of the complex ion formed when the following reactions takes place:

- (a) Zinc reacting with excess ammonia solution. (1mk)

- (b) Aluminium reacting with excess sodium hydroxide solution. (1mk)

17. Chlorine water was left in the sunlight as shown in the set-up below.



(a) State and explain the observation that was made after one day? (2mks)

(b) Write an equation for the reaction that took place. (1mk)

18. The table below gives the rate of decay for a radioactive element M.

Number of days	Mass (g)
0	12.8
280	0.8

Determine the half-life of the radioactive element M. (2mks)

19. 10.26g of aluminium sulphate were dissolved in 200cm³ of water. Calculate the molar concentration of the sulphate ions in the solution. (Al = 27.0, S = 32.0, O = 16.0) (3mks)

23. An element X from an ion with the formula X^+ . The electronic configuration of the ion of X is 2.8.

(i) To which family of elements does element X belong? (1mk)

(ii) Write an equation for reaction of element X and water. (1mk)

(iii) State and explain the effect of the resulting solution in (ii) above on litmus solution. (1mk)

24. In an experiment to determine the solubility of potassium nitrate at 30°C , a saturated solution was heated in an evaporating dish until there was no further change in mass. The following data was obtained.

Mass of empty dish = 94.3g

Mass of empty dish + saturated solution = 128.9g.

Mass of empty dish + salt = 103.9g.

Determine the solubility of potassium nitrate at 30°C . (3mks)

25. When magnesium is burnt in air, it reacts with both nitrogen and oxygen gases. Write the formulae of the two products formed. (2mks)

26. (a) 48g of methane was burnt in excess oxygen. Determine the volume of the methane gas used at room temperature and pressure. (1 mole of any gas at r.t.p = 24 litres, C = 12, H = 1). (2mks)

(b) State **one** use of methane.

(1mk)

27. Isotope ${}_{90}^{228}\text{Th}$ decay to ${}_{82}^{216}\text{Pb}$ as the result of alpha particles and Beta particle decay.

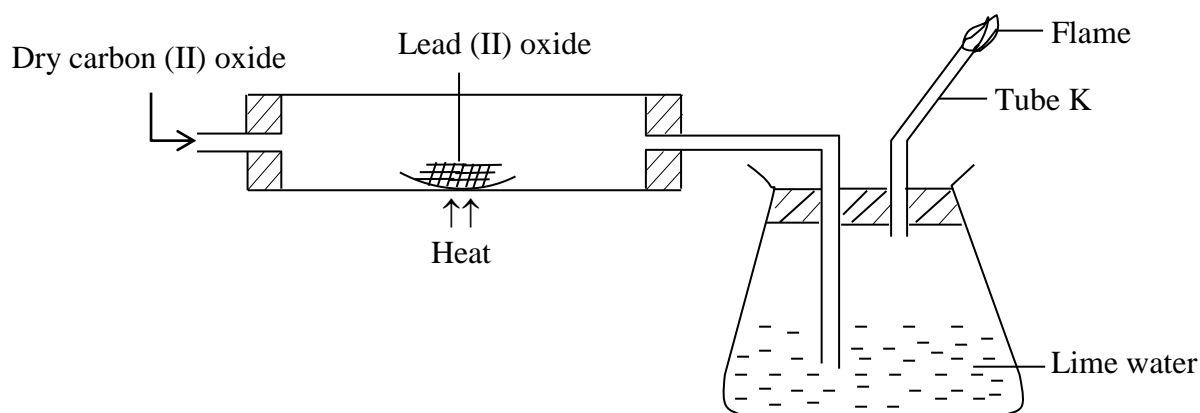
(a) Determine the numerical value of alpha and Beta particles emitted.

(2mks)

(b) Write a nuclear equation for (a) above.

(1mk)

28. The apparatus shown below was used to investigate the effect of dry carbon (II) oxide on lead (II) oxide.



(a) State the observation that was made in the combustion tube at the end of the experiment. (1mk)

(b) Write an equation for the reaction which took place.

(1mk)

(c) State use of carbon (II) oxide.

(1mk)

29. Study the information given below and answer the questions that follow:

<u>Bond</u>	<u>Bond energy (KJ mol⁻¹)</u>
C – H	414
Cl – Cl	244
C – Cl	326
H – Cl	431

Calculate the enthalpy change for the reaction.

