NAME _____ INDEX NO. _____

SIGNATURE _____

DATE _____

233/1
CHEMISTRY
PAPER 1
(THEORY)
JULY, 2017
TIME: 2 HOURS

KITUI COUNTY MOCK

END OF TERM II FORM FOUR EXAMINATION, 2017

Kenya Certificate of Secondary Education (K.C.S.E)

233/1
CHEMISTRY
PAPER 1
(THEORY)
TIME: 2 HOURS

INSTRUCTIONS

1. Write your name and index no. in the spaces provided above.
2. Sign and write the date of examination in the space provided above.
3. Answer **ALL** the questions in the spaces provided.
4. Mathematical tables and silent electronic calculators may be used.
5. All working **MUST** be clearly shown where necessary.
6. This paper consists of **11** printed pages.
7. Candidates should check to ensure that all pages are printed as indicated and no questions are missing.

FOR EXAMINER'S USE ONLY

QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
1 - 29	80 marks	

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1. The table below shows the pH values of some solutions.

Solutions	J	K	L	M	N
pH	6	13	2	10	7

a) Which solution is likely to be:

i) Potassium hydroxide. (1 mark)

ii) Lemon juice. (1 mark)

b) Explain why a solution of hydrogen chloride gas in methylbenzene was identified as N. (1 mark)

c) Compare the electrical conductivity of solution J and L. (1 mark)

2. Name the process that takes place when:

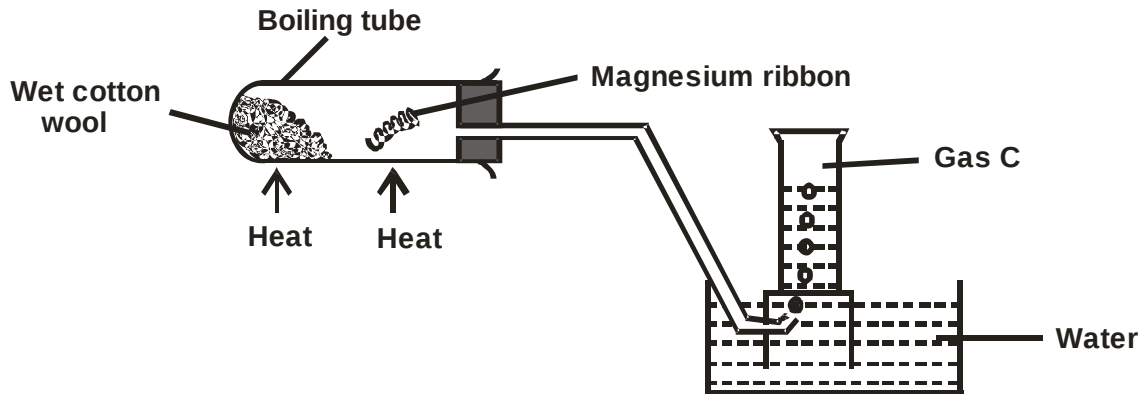
i) Sulphur is heated with natural rubber. (1 mark)

ii) Fats or oils are hydrolysed using an alkali. (1 mark)

3. a) Oxygen is obtained by fractional distillation of liquid air.
Name **two** other gases which are obtained from this process during distillation. (1 mark)

b) Give **two** industrial uses of oxygen gas. (2 marks)

4. The diagram below represents the apparatus used to react steam with magnesium.



a) State an observation made in the boiling tube. (1 mark)

_____

_____

b) Write an equation for the reaction that takes place in the boiling tube. (1 mark)

_____

c) State and explain **one** precaution required before the heating is stopped. (2 marks)

_____

_____

_____

5. State and explain how an increase in pressure will affect the equilibrium position in the following reactions.

a) $2SO_{2\,(g)} + O_{2\,(g)} \rightleftharpoons 2SO_{3\,(g)}$ (1 mark)

_____

_____

b) $H_{2\,(g)} + Cl_{2\,(g)} \rightleftharpoons 2HCl_{\,(g)}$ (1 mark)

_____

_____

6. Given a mixture of sodium chloride, silver chloride and ammonium chloride, describe how each component can be obtained. (2 marks)

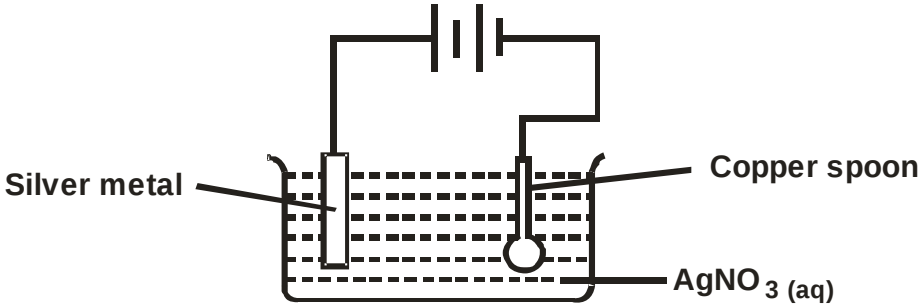
_____

_____

_____

_____

7. A copper spoon was coated with silver metal as shown below.



i) Write an equation for the reaction that occurs at the copper spoon (cathode). (1 mark)

_____

_____

ii) How many grams of silver would be deposited on the spoon in two hours using steady current of 0.03A? (IF = 96500C, Ag = 108.0) (3 marks)

_____

_____

_____

_____

_____

_____

_____

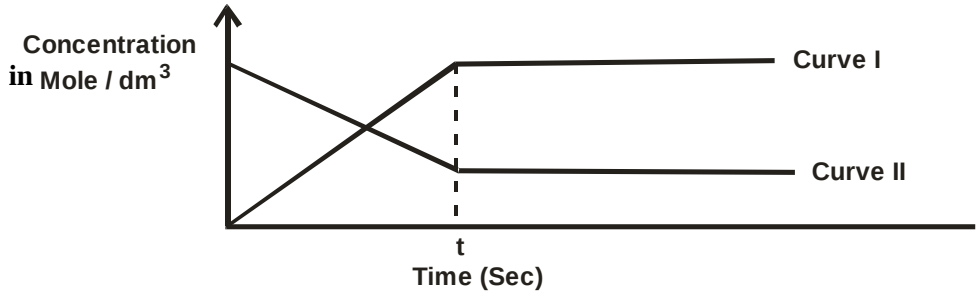
8. Using dost (•) and crosses (**X**) to represent electrons, show bonding in

a) Ammonia molecule. (1 mark)

b) Calcium oxide. (1 mark)

9. The curve below represents the changes in the concentration of substances E and F with time in the equation.

$E_{(g)} \rightleftharpoons F_{(g)}$



a) Which curve represents the changes in the concentration of substance F? Give a reason. (2 marks)

_____

_____

_____

b) Give a reason for the shapes of the curves after time (t) seconds. (1 mark)

_____

_____

_____

10. The following two tests were carried out on chlorine water contained in two test-tubes.

a) A piece of blue flower was dropped into the first test-tube. Explain why the flower bleached. (2 marks)

_____

_____

_____

b) The second test-tube was corked and exposed to sunlight.
After a few days, it was found to contain a gas that rekindled a glowing splint.
Write an equation for the reaction which produced the gas. (1 mark)

_____

11. State any **two** differences between a luminous and a non-luminous flame. (2 marks)

_____

_____

_____

_____

_____

12. Potassium hydroxide of mass Yg was dissolved in distilled water to make 200cm^3 of solution. 100cm^3 of the solution required 100cm^3 of 2M nitric acid for complete neutralization. Calculate the value of Y. (K = 39, O = 16, H = 1) (3 marks)

13. Explain how electrical conductivity may be used to distinguish between magnesium oxide and silicon (IV) oxide. (3 marks)

14. In the nuclear reaction below:

$$^{235}_{92}U + {}^{1}_{0}n \longrightarrow {}^{90}_{42}Sr + {}^{x}_{y}Xe + 3\,{}^{1}_{0}n + \text{Energy}$$

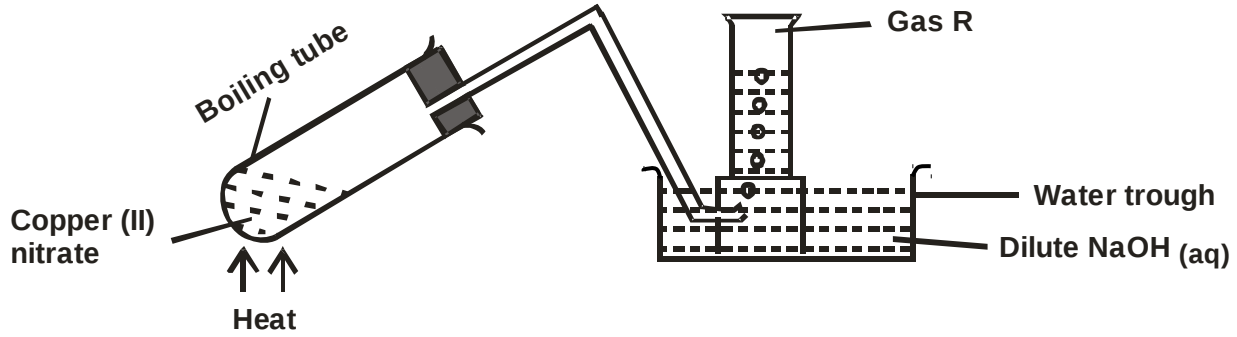
a) Identify the value of x and y.

x (½ mark)

y (½ mark)

b) State **two** applications for radioisotopes. (1 mark)

15. The diagram below shows the effect of heat on copper (II) nitrate.



a) State **two** observations made in the boiling tube. (1 mark)

_____

_____

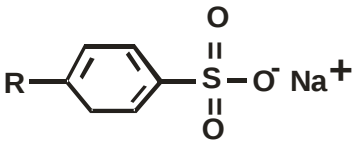
b) Write the equation for the reaction that takes place in the water trough. (1 mark)

_____

c) How would you confirm the identity of gas R? (1 mark)

_____

16. The structure below represents a cleaning agent which is said to have both an advantage and a disadvantage.



a) Which type of cleaning agent does the structure above represent? (1 mark)

_____

b) State:

i) **one** advantage (1 mark)

_____

ii) **one** disadvantage (1 mark)

_____

17. a) State and explain Boyle's law on the behavior of gases. (2 marks)

_____

_____

_____

b) State **two** conditions under which gases are likely to behave as ideal. (1 mark)

_____

_____

18. Both diamond and graphite have giant atomic structures.

Explain why diamond is hard while graphite is soft. (2 marks)

19. a) What is meant by the terms

i) Element (1 mark)

ii) Atomic number (1 mark)

b) The formula for a chloride of Titanium is $TiCl_3$. What is the formula for its sulphate? (1 mark)

20. A student investigated the effect of an electric current by passing it through some substances.

The student used inert electrodes and connected a bulb to the circuit.

The table below shows the substances used and their states.

Experiment	Substance	State
1	Potassium carbonate	Solid
2	Copper (II) Sulphate	Solution
3	Sugar	Solution
4	Lead (II) Iodide	Molten

a) In which experiment did the bulb not light? (1 mark)

b) Explain your answer in (a) above. (2 marks)

21. a) Name **one** natural polymer. (1 mark)

_____

b) Give **one** advantage of synthetic fibres over natural fibres. (1 mark)

_____

_____

22. The table below gives the atomic numbers of elements, W, X, Y and Z. the letters do not represent the actual symbols of the elements.

Element	W	X	Y	Z
Atomic number	9	10	11	12

a) Which one of the elements is least reactive? Explain. (1 mark)

_____

_____

b) i) Which **two** elements would react most vigorously with each other? (1 mark)

_____

_____

ii) Give formula of the compound formed when the elements in b (i) react. (1 mark)

_____

23. a) Name **two** ores from which copper is extracted? (1 mark)

_____

_____

b) During extraction of copper metal, the ore is subjected to froth flotation.
Give a reason why this process is necessary. (1 mark)

_____

_____

c) Name **one** alloy of copper and state its use. (1 mark)

_____

_____

24. The table below is part of the periodic table. The letters do not represent the actual symbols of the elements. Study it and answer the questions that follow.

					C	D	E	F
G	H						I	

a) Select an element which is stored in paraffin in the laboratory. (1 mark)

_____

b) How do the Ionic radii of E and I compare? Explain. (2 marks)

25. Use the information below to answer the questions that follow.

Equation	Enthalpy of formation
$H_{2\,(g)} + ½O_{2\,(g)} \rightarrow H_2O_{(l)}$	$\Delta H_1 = -286\ KJmol^{-1}$
$C_{(s)} + O_{2\,(g)} \rightarrow CO_{2\,(g)}$	$\Delta H_2 = -394\ KJmol^{-1}$
$2C_{(s)} + 3H_{2\,(g)} + ½O_{2\,(g)} \rightarrow C_2H_5OH_{(l)}$	$\Delta H_3 = -277\ KJmol^{-1}$

a) Define the term enthalpy of formation of a compound. (1 mark)

b) Calculate the molar enthalpy of combustion ΔH_4 of ethanol.

$C_2H_5OH_{(l)} + 3O_{2\,(g)} \rightarrow 2CO_{2\,(g)} + 3H_2O_{(l)}$ (2 marks)

26. Nitrogen forms many compounds in which its oxidation state varies.

a) What is meant by oxidation state? (1 mark)

b) What is the oxidation state of nitrogen in Mg_3N_2? (1 mark)

c) Explain why high temperature is required for nitrogen to react with oxygen. (1 mark)

27. Draw and name the isomers of pentane. (3 marks)

28. When a student was stung by a nettle plant a teacher applied an aqueous solution of ammonia to the affected area of the skin and the student was relieved of pain. Explain. (2 marks)

_____

_____

_____

29. Distinguish between ionization energy and electron affinity of an element. (2 marks)

_____

_____

_____