
KENYA NATIONAL EXAMINATION COUNCIL
REVISION MOCK EXAMS 2016
TOP NATIONAL SCHOOLS

NAIROBI SCHOOL
CHEMISTRY
PAPER 1
TIME: 2 HOURS

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233/1
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**NAIROBI SCHOOL KCSE TRIAL AND
AND PRACTICE EXAM 2016**

INSTRUCTIONS TO CANDIDATES:

- Write your name and Index number in the space provided above.
- Answer *all* the questions in the spaces provided.
- All working **must** be clearly shown where necessary.
- Mathematical tables and electronic calculators can be used.

Question	Maximum score	Candidate's score
Score 1 - 29	80	

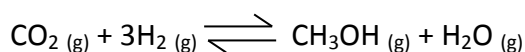
1. The electron arrangement of ions R^{2-} and Q^{3+} are 2.8.8 and 2.8 respectively
- (a) Write the electron arrangement of the elements.
- (b) Write the formula of the compound that would be formed when Q and R react. (1mk)
2. (a) Complete the table below (1mk)

Species	Number of electrons	Number of neutrons
${}^3_2\text{He}^{2+}$		

- (b) An element Z has atomic number 15. It can form the ions Z^{3-} and Z^{3+} . Identify the stable ion.

Explain (1mk)

3. Methanol is manufactured from carbon (IV) oxide and hydrogen gas according to the equation below:

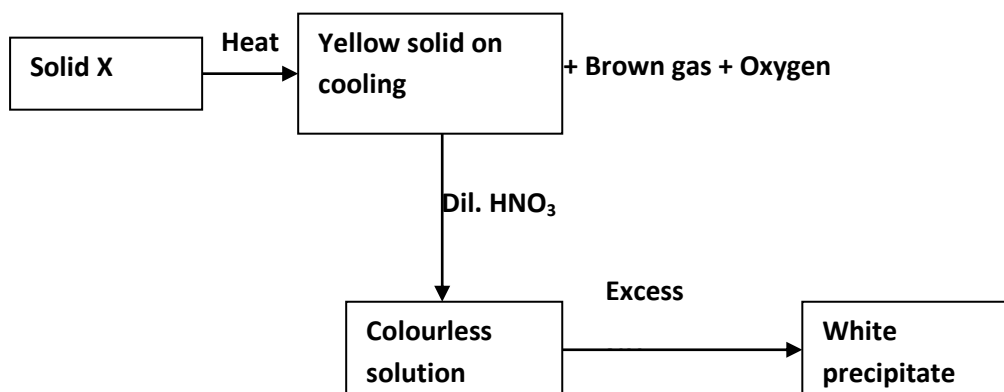


The reaction is carried out in the presence of a chromium catalyst at 700K and 30kPa. Under these conditions, an equilibrium is reached when 2 % of the carbon (iv) oxide is converted to methanol?

- (a) How does the rate of forward reaction compare with that of the reverse reaction when 2% of the carbon(iv)oxide is converted to methanol? (1mk)
- (b) Explain how each of the following conditions would affect the yield of methanol:
- (i) Reduction in pressure (1mk)
- (ii) Using a more efficient catalyst. (1mk)
- (c) If the reaction is carried out at 500K and 30kPa the percentage of carbon (iv) oxide converted is higher than 2%. What is the sign of ΔH for the reaction? Explain. (1mk)

4. A volume of 280 cm^3 of nitrogen gas diffuse through a membrane in 70 seconds. How long will it take 400 cm^3 of carbon (IV) oxide to diffuse through the same membrane? ($N = 14, C = 12, O = 16$) (2mks)

- 5 Study the diagram below and answer the questions that follow.



- (a) Identify
- (i) Solid X (1mk)
- (ii) Yellow solid (1mk)
- (iii) White precipitate (1mk)
- (b) Write ionic equations for reactions that would occur if excess sodium hydroxide is added to the colourless solution (2mks)

6. The table below shows the number of drops of soap solution needed to lather with 10 cm^3 of water.

Sample	Cold water	Heated water
A	5	5
B	6	2
C	2	2

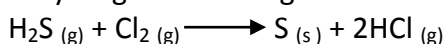
- (a) Identify the anions likely to be in:
 (b) State **two** methods used in removing temporary hardness of water. (1mk)

7. The table below shows the atomic numbers of elements **P**, **Q** and **R**

Elements	P	Q	R
Atomic No.	13	7	12

- (a) Explain why **P** and **R** would not be expected to form a compound (1mk)
 (b) Write an equation to show the effect of heat on the carbonate of **R** (1mk)
8. Calculate the volume of chlorine gas in cm^3 (measured at s.t.p) that is formed when a current of 0.9 A is passed through a solution of concentrated sodium chloride for 30 minutes.
 ($\text{Na} = 23$, $\text{Cl} = 35.5$, Faraday constant = 96500, M.G V = 22.4dm^3) (2mks)
9. Ethene and ethyne are unsaturated hydrocarbons.
 (a) Explain what is meant by unsaturated hydrocarbon. (1mk)
 (b) Apart from using combustion, bromine liquid or potassium manganate (VII) solution, describe how you would distinguish between ethene and ethyne by chemical means (2mks)
10. Describe how a sample of Iron (II) Carbonate can be prepared using dilute hydrochloric acid (3mks)

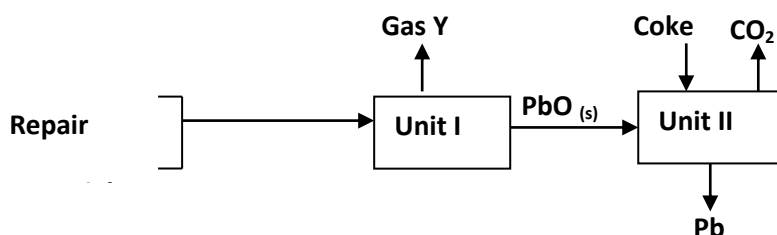
11. In an experiment a gas jar containing 70cm^3 of chlorine gas was inverted over another containing 70cm^3 of hydrogen sulphide gas. The two gases reacted according to the equation below to form 80cm^3 of hydrogen chloride gas.



- (a) Using oxidation number identify the oxidizing agent (1mk)
 (b) Calculate the percentage yield of hydrogen chloride gas (2mks)
12. The table below gives the standard electrode potentials for a number of half reactions

E^θ (volts)		
$\text{A}^{2+}_{(aq)} + 2e^- \longrightarrow$	$\text{A}_{(s)}$	- 2.90
$\text{B}^{2+}_{(aq)} + 2e^- \longrightarrow$	$\text{B}_{(s)}$	-2.38
$\text{C}^+_{(aq)} + e^- \longrightarrow$	$\frac{1}{2} \text{C}_{2(g)}$	0.00
$\text{D}^{2+}_{(aq)} + 2e^- \longrightarrow$	$\text{D}_{(s)}$	+ 0.34
$\frac{1}{2} \text{E}_{2(aq)} + e^- \longrightarrow$	$\text{E}_{(aq)}$	+ 2.87

- (i) Write a cell representation of the two half cells which would produce the highest e.m.f (1mk)
 (ii) Calculate the e.m.f of the cell above. (1mk)
13. The flow chart below shows some process involved in extraction of lead metal. Study and answer the questions that follow.

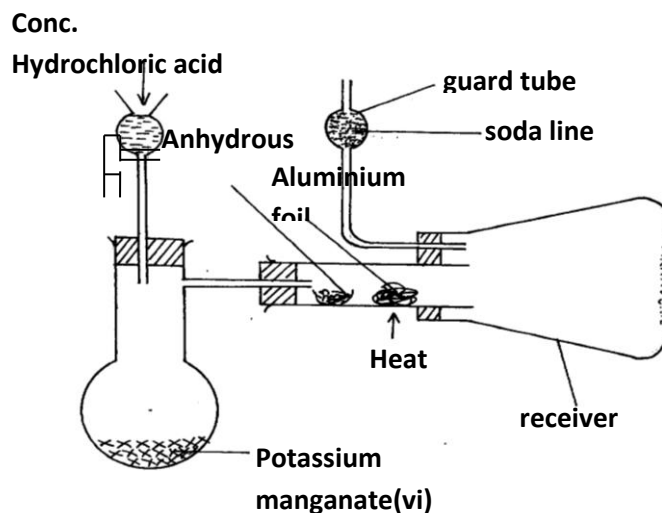


- (a) (i) Name **two** main raw materials that were fed into unit I (1mk)
 (ii) State the process taking place in unit I (1mk)
 (b) State **two** environmental hazards associated with process in unit I (1mk)
14. The table below shows information about three substances **K**, **L** and **M**. Study it and answer the questions that follow:

SOLID	COLD WATER	HOT WATER
K	Soluble	soluble
L	Insoluble	Insoluble
M	Insoluble	Soluble

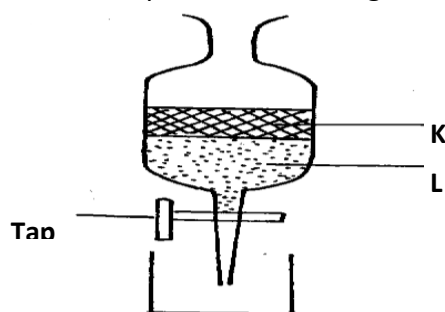
Describe how you will separate the **three** solids from a mixture of three. (3mks)

15. The diagram below shows the set up used in an experiment to prepare chlorine gas and react it with aluminium foil. Study it and answer the questions that follow



- State any **one** precaution that should be taken in carrying out this experiment (½mk)
- Write the formula of another compound that could be used instead of potassium manganate (VII) crystals (½mk)
- Explain why it is necessary to allow the acid to drip slowly onto potassium manganate (VII) crystals before heating the aluminium foil. (1mk)
- When 1.08g of aluminium foil were heated in a stream of chlorine gas the mass of the product formed was 3.47g.
Calculate;
 - The maximum mass of the product if chlorine was in excess. (Al = 27, Cl = 35.5) (2mks)
 - The percentage yield of the product formed (1mk)

16. Methyl benzene was added to a solution of iodine and sodium chloride. The mixture was placed in the apparatus below for separation. The diagram below shows the results obtained.

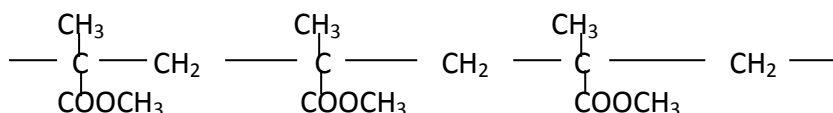


- Name the apparatus (½mk)
 - Explain the purpose of using methylbenzene (1mk)
 - Name the major component of layer L (½mk)
17. The table below shows the relative molecular masses and the boiling points of pentane and propan-1-ol

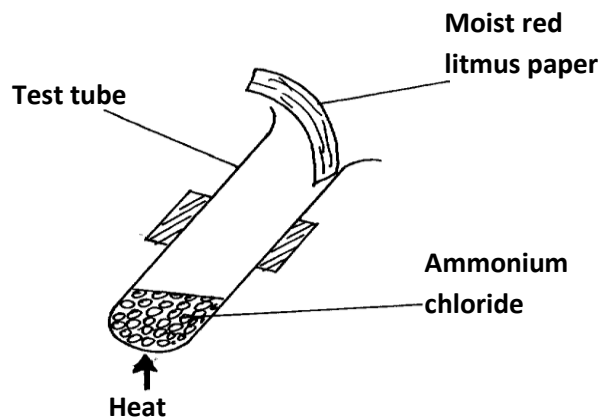
	Relative molecular mass	Boiling point (°C)
Pentane	72	36
Propan-1-ol	60	97

Explain why the boiling point of propan-1-ol is higher than that of pentane. (2mks)

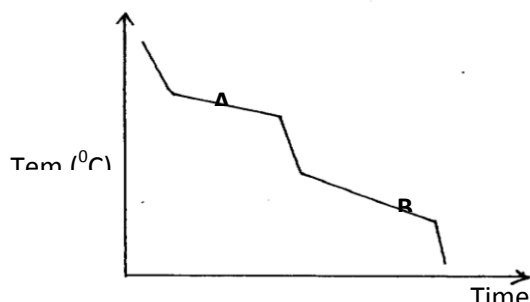
18. (a) State the function of glass beads during fractional distillation in
 (i) Boiling flask (1mk)
 (ii) Fractionating column (1mk)
 (b) Give **one** industrial application of solvent extraction (1mk)
19. 20cm^3 of sodium hydroxide solution containing $8.0\text{g}/\text{dm}^3$ were required for complete neutralization of 0.18g of a dibasic acid H_2X .
 Calculate the relative molecular mass of the acid (3mks)
20. A dry gas **X** was passed over heated lead (II) oxide. A grey residue and a gas **Y** were formed. The gas **Y** has no effect on red litmus paper and does not support combustion. Identity:
 (i) Gas **X** (1mk)
 (ii) Gas **Y** (1mk)
21. The structure below represents a polymer



- (a) State the name of the polymer (1mk)
 (b) State **one** industrial use of the polymer (1mk)
22. The set up below was used to heat a sample of ammonium chloride. Study it and answer the question that follow.



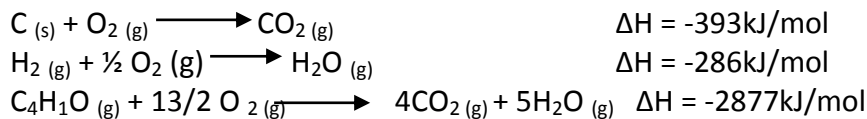
- Explain the observations made in the red litmus paper. (3mks)
23. The following is a cooling curve of a certain substance.



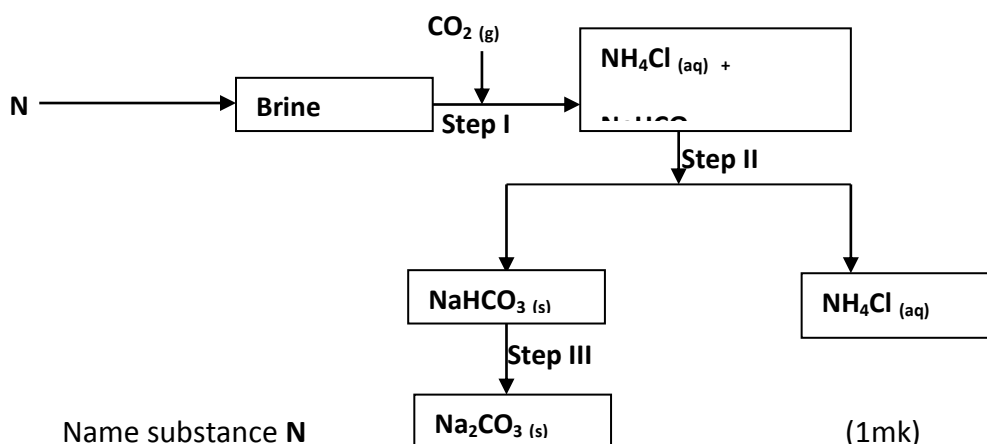
- (a) Is this a pure or impure substance? Explain (1mk)
 (b) Explain using kinetic theory what happens in region **A** (1mk)
24. (a) Distinguishing between weak and strong alkali (1mk)
 (b) The following is a list of pH values of some substance:

Substance	M	N	V	X	Z
pH	10.6	7.2	13.2	5.9	1.5

- Identify:
 (i) Strong acid (1mk)
 (ii) Weak base (1mk)
25. Study the following reactions and answer the questions that follow:



- (a) Construct the energy cycle diagram for the reactions (1mk)
- (b) Determine the heat of formation of butane (2mks)
26. (a) Draw the structure of a sulphur molecule (1mk)
- (b) When a sample of sulphur is heated in a test tube, it changes into amber liquid which flows easily. On further heating the liquid becomes dark and does not flow easily. Explain these observations (2mks)
27. Ammonia gas reacts with water according to the equation below.
- $$\text{NH}_3 \text{ (g)} + \text{H}_2\text{O (l)} \rightleftharpoons \text{NH}_4^+ \text{ (aq)} + \text{OH}^- \text{ (aq)}$$
- (a) Identify the species that acts as a base. Give a reason. (1mk)
- (b) What effect does addition of sodium hydroxide solution have on the position of the equilibrium? Explain. (2mks)
28. The flow chart below shows some of the stages in the manufacture of sodium carbonate by the solvay process. Use it to answer the questions that follow:



- (a) Name substance N (1mk)
- (b) Name the process taking place in
- (i) Step II (1mk)
- (i) Step III (1mk)
- (c) Write an equation for the reaction producing sodium carbonate. (1mk)