

233/1  
CHEMISTRY  
Paper 1  
THEORY  
Time: 2 hours

**ALLIANCE GIRLS' HIGH SCHOOL  
MOCK EXAM**

**INSTRUCTIONS TO CANDIDATE**

1. Answer **ALL** the questions in the spaces provided after each question paper.
2. Non-programmable, silent calculators and KNEC Mathematical tables may be used.
3. All working **MUST** be clearly shown where necessary.
4. Candidates may be penalized for not following the instructions given in this paper.

**For Examiner's use only**

Questions	Maximum Score	Candidate's Score
1 - 28	80	
<b>TOTAL SCORE</b>	<b>80</b>	

**This paper consists of 8 printed pages.**

**Candidates should check the question paper to ensure that all the pages are printed as indicated and that no questions are missing.**

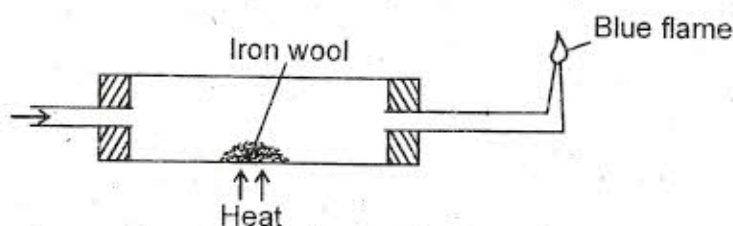
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1. (a) Mary walked into the Chemistry lab, her long hair neatly tied back, her long toe nails polished red and well visible in her lovely black sandals, all ready for the afternoon experiment. Step 1 of the experiment involved the use of a colourless solution in an unmarked beaker, which she quickly tasted to confirm its identity. How many laboratory rules has Mary broken? (1 mark)

- (b) Under what condition is the Bunsen flame below formed? (1 mark)



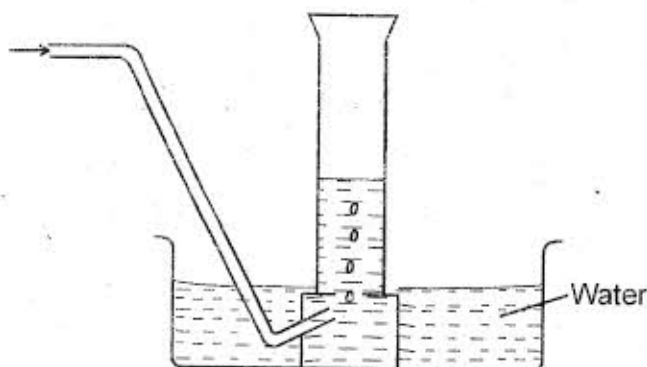
2. Dry hydrogen chloride gas was passed over heated iron wool as shown below.



- (i) State the observation made in the combustion tube at the end of the experiment. (1 mark)

- (ii) Write the equation of the reaction that gave the blue flame. (1 mark)

3. (a) Name the gas collection method shown below. (1 mark)

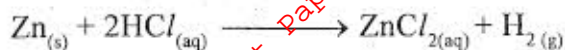


- (b) Give an example of a gas that cannot be collected by this method. (1 mark)

4. (a) State the kinetic theory of matter. (1 mark)

- (b) Using the theory in (a) above explain what happens when steam condenses into water. (1 mark)

5. The following equation represents a redox reaction.



(i) Identify the oxidized species. (1 mark)

(ii) Give the equation for the reduction step. (1 mark)

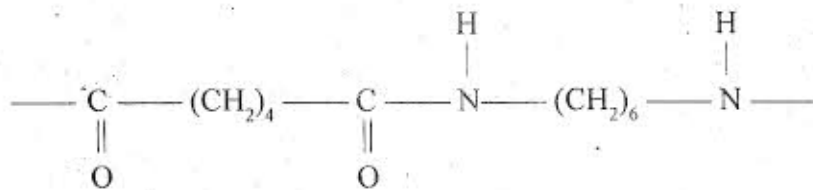
6. (i) State the product of electrolysis of molten copper (II) chloride at the cathode. (1 mark)

(ii) Explain why the copper (II) chloride must be kept hot. (1 mark)

(iii) Mercury is not an electrolyte. Explain this observation. (1mk)

7. At room temperature and pressure hydrogen fluoride is a liquid with a boiling point of  $20^{\circ}\text{C}$  while hydrogen chloride is a gas with boiling point of  $-85^{\circ}\text{C}$  at the same conditions. Explain. (2 marks)

8. The structure below shows the repeat unit in a polymer.



(i) Name the polymer. (1 mark)

(ii) Draw the structures of the monomeric units. (2 marks)

(iii) State one characteristics of the type of polymerization represented above. (1 mark)

9.  $75\text{cm}^3$  of  $3\text{M H}_2\text{SO}_4$  solution was diluted to  $0.2\text{M}$ . What was the volume of the dilute solution? (2 marks)

10. When  $3\text{g}$  magnesium powder was burnt in air,  $4.6\text{g}$  of its oxide was obtained. Calculate the percentage yield of the magnesium oxide. ( $\text{Mg} = 24, \text{O} = 16$ ) (2 marks)

11. Describe how you can prepare crystals of potassium sulphate starting with 50cm<sup>3</sup> of 1M Potassium hydroxide solution. (3 marks)

12. The table below shows the number of valence electrons in elements P, Q and R.

Element	P	Q	R
No. of valence electrons	3	5	2

(a) Explain why P and R would not be expected to react together to form a compound. (1 mark)

(b) Write a chemical equation to show the effect of heat on R – carbonate. (1 mark)

(c) Give the formula of the most stable ion of Q. (1 mark)

13. (a) State one advantage of universal indicator over other acid-base indicator. (1 mark)

(b) The following substances were tested with two drops of universal indicator solution, and the colours obtained are as listed below.

Substance	Colour of universal indicator
Baking powder	Pale blue
Sugar	Green
Mineral water	Orange
Grape juice	Pink
Washing soda	Deep blue

Arrange these substances in order of decreasing acidity. (1 mark)

(c) Other than effect on litmus paper, give one other physical property each of;

(i) an acid ..... (1mk)

(ii) a base ..... (1mk)

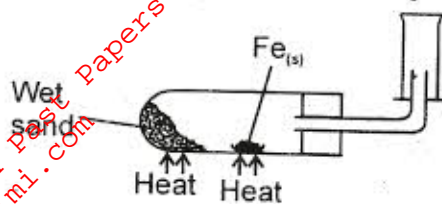
14. From a list of metals, zinc, lead, copper and sodium:

(a) Suggest the one most suitable for a reaction with a dilute acid to give a sample of hydrogen gas in the lab. (1 mark)

(b) Give one reason for rejecting each of the metals from the list for the reaction in (a) above. (3 marks)



19. Study the set up below and answer the questions that follow.



(a) Write an equation for the reaction that occurs in the boiling tube. (1 mark)

(b) Identify the reducing agent in this reaction. (1 mark)

20. (a) Use the information below to answer the questions that follow.

$$\Delta H^{\circ}_{\text{latt}} \quad \text{MgCl}_{2(s)} = -2489 \text{ kJmol}^{-1}$$

$$\Delta H^{\circ}_{\text{hyd}} \quad \text{Mg}^{2+}_{(g)} = -1891 \text{ kJmol}^{-1}$$

$$\Delta H^{\circ}_{\text{hyd}} \quad \text{Cl}^{-}_{(g)} = -384 \text{ kJmol}^{-1}$$

Calculate the heat of solution of  $\text{MgCl}_2$  using an energy level diagram. (2mks)

(b) Give one example each of:

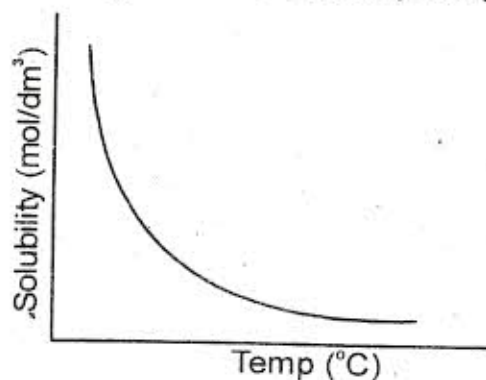
(i) An exothermic physical change. (1 mark)

(ii) An endothermic physical change. (1 mark)

21. State two advantages of polythene over iron for making household articles such as buckets. (2 marks)

22. A certain mass of a gas occupies  $211 \text{ cm}^3$  at  $18^{\circ}\text{C}$  and  $740 \text{ mmHg}$  pressure. What volume will it occupy (when still gaseous) at  $-20^{\circ}\text{C}$  and  $770 \text{ mmHg}$  pressure? (2 marks)

23. The graph below represents the solubility of a gas in water.



- (a) What conclusion can be made about the solubility of the gas in water. (1 mark)
- (b) On analysis, 115g of a saturated solution of sodium nitrate is found to contain 65g sodium nitrate at 65°C. Calculate the solubility of sodium nitrate at 65°C. (2 marks)

24. Consider the elements  ${}_{12}^{24}\text{M}$  and  ${}_{9}^{19}\text{N}$

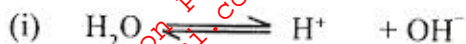
- (a) Write the formula of the compound of M and N. (1 mark)
- (b) What type of bonding is in the compound of M and N? (1 mark)
- (c) Use dots (•) and cross (×) diagram to show bonding in N. (1 mark)
25. (a) Radium 226, whose atomic number is 88, undergoes beta decay to form a new element x. Write an equation for this change. (1 mark)
- (b) Given 1g  ${}_{84}^{214}\text{Po}$  of how much of it would be left after  $3 \times 10^4$  seconds? (half life Po =  $1.5 \times 10^4$  seconds) (1 mark)
- (c) Give two differences between nuclear and chemical reactions. (2 marks)

Nuclear	Chemical
(i)	
(ii)	

26. A small amount of lime (calcium hydroxide) was added to 10litres of water containing 0.85g/lit. Calcium hydrogen carbonate solution.
- (a) Write an equation for the reaction that took place. (1 mark)
- (b) How much lime was needed to react with all the calcium hydrogen carbonate in the water?(Ca = 40, O = 16, H = 1, O = 12) (2 marks)

- (c) Give two other ways of removing the calcium hydrogen carbonate from the water. (2 marks)

27. Study the equations below on the behaviour of water



What property of water do the two equations illustrate? Explain your answer. (2 marks)

28. A piece of blue litmus paper was placed into a beaker containing water into which some aluminium chloride had been dissolved.

- (a) Is dissolving of aluminium chloride in water a physical or chemical process? Explain your answer. (2 marks)
- (b) State the observation made on the litmus paper. Explain your answer using an equation. (2 marks)