

SAMPLE PAPER 4**CHEMISTRY****233 / 1**

1. The table below indicates the pH values of solutions labeled A,B,C,D and E.

Solution	A	B	C	D	E
pH value	5	13	2	10	7

Identify the solution

- (i) Containing the highest concentration of hydrogen ions. ½ mk
- (ii) Which solution is likely to be acetic acid ? Give a reason. 1mk
- (iii) Which is likely to be common salt solution. ½ mk

2. The table below gives the heat of combustion of carbon, Hydrogen and methane

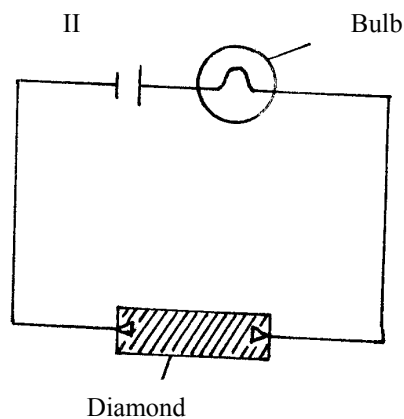
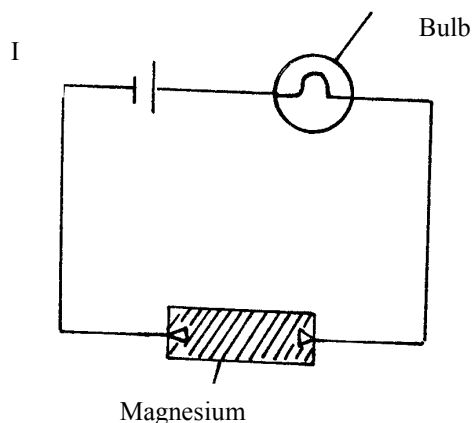
Substance	Heat of combustion
Carbon C	- 393 KJ mol ⁻¹
Hydrogen (H ₂)	-285 KJ mol ⁻¹
Methane (CH ₄)	- 887 KJ mol ⁻¹

Use the above information to calculate the heat of formation of methane. 3mks

3. An organic compound K reacts with fluorine to form a compound with formula CH₃CHFCHFCH₃

- a) Draw the structural formula of K. 1 ½ mks
- b) To which homologous series does K belong. ½ mk
- c) Give the I.U.P.A.C. name of the product above. 1mk

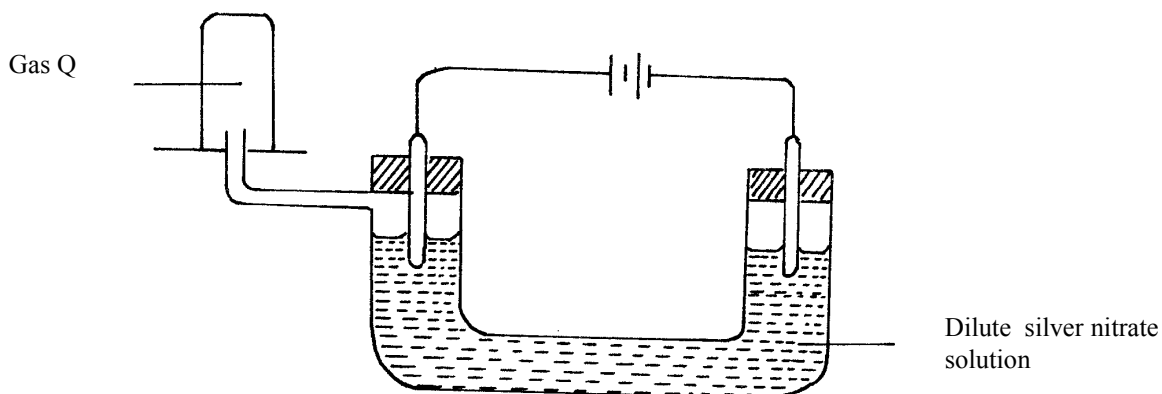
4. The following set-ups were used by form two students to investigate electrical conductivities of two substances. Study and use it to answer the question that follow.



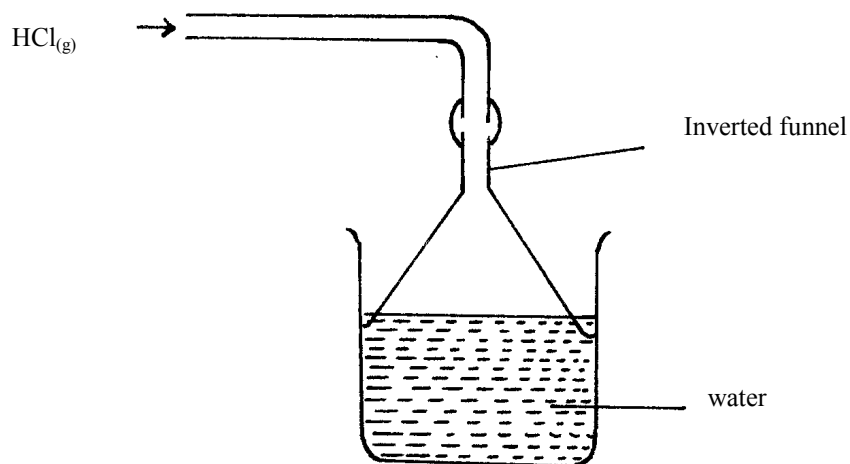
Explain the difference in observation made in set-ups I and II above

3mks

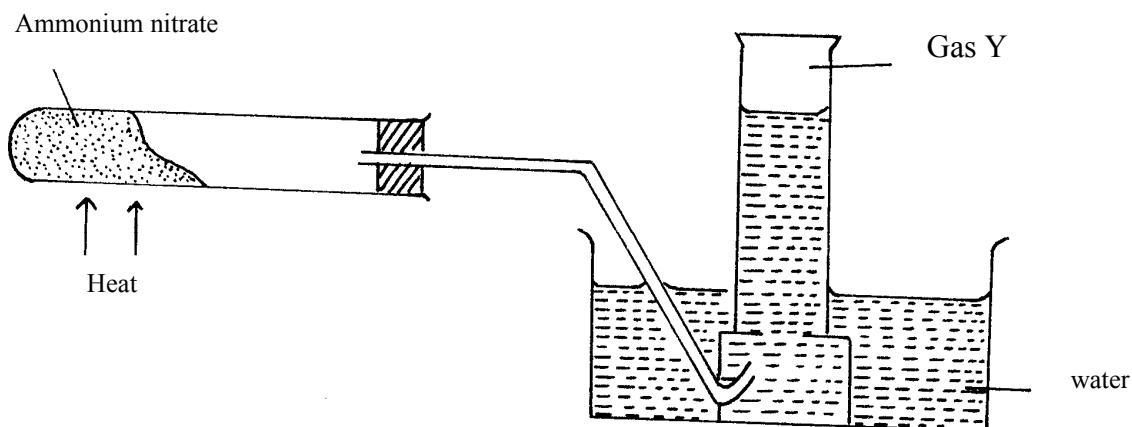
5. A current of 0.2 amperes was passed through lead (II) nitrate for 25 minutes. Determine the mass of lead deposited at the cathode. (Pb=207, IF=96500C) 3mks
6. Determine the oxidation state of manganese in MnO_3 . Hence give its systematic name 3mks*NDI*
7. Use the set-up below to answer the questions that follow.



- a) Give the equation for the reaction taking place at cathode. 1mk
- b) What is the identity of gas Q? 1mk
8. State and explain the observation made when burning magnesium is lowered into a gas jar containing sulphur (IV)oxide gas. 2mks
9. 800g of a radioactive isotope decays to 50g in 100 days. Determine the half-life of the isotope. 2mks
10. The solubility of potassium nitrate in water $75^{\circ}C$ is 155g/100g water and at $20^{\circ}C$ is 31g/100g water. Calculate the mass of potassium nitrate that must be taken to give 100g of crystals. When a saturated solution at $75^{\circ}C$ is cooled to $20^{\circ}C$. 3mks
11. An aqueous solution of hydrogen chloride can be prepared as shown in the diagram below.

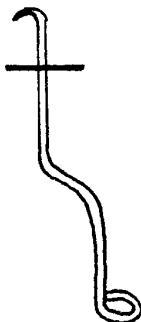


- a) Give two reasons for using an inverted funnel. 1mk
- b) Few drops of silver nitrate solution were added to 4cm^3 of the solution obtained above, followed by excess aqueous ammonia. Explain the observation made. 2mks
12. Magnesium reacts with nitrogen to form a white solid known as magnesium nitride.
- (i) Write the chemical equation for the reaction taking place. 1mk
- (ii) Briefly outline a chemical test that can be used to distinguish magnesium nitride from magnesium oxide. 2mks
13. When hydrogen gas was passed over heated lead (II) oxide in a combustion tube and the gaseous product cooled, a colourless liquid was obtained.
- a) (i) Name the colourless liquid. $\frac{1}{2}$ mk
- (ii) Which chemical test would you use to confirm the colourless liquid above? $\frac{1}{2}$ mk
- b) What observation can be made in the combustion tube? 1mk
- c) Write an equation for the reaction between hydrogen and the lead (II) oxide. 1mk
14. The set up shown below was used to prepare gas Y. study it and answer the questions that follow.

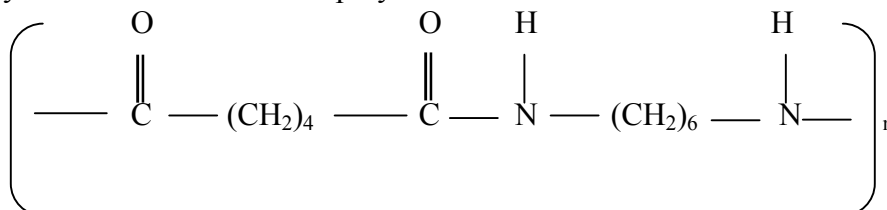


- a) Identify gas Y. 1mk
- b) Give the confirmatory test for gas Y. 1mk
- c) State one use of gas Y. 1mk
15. The apparatus shown below is commonly used in a chemistry laboratory. Give its name and state one use.

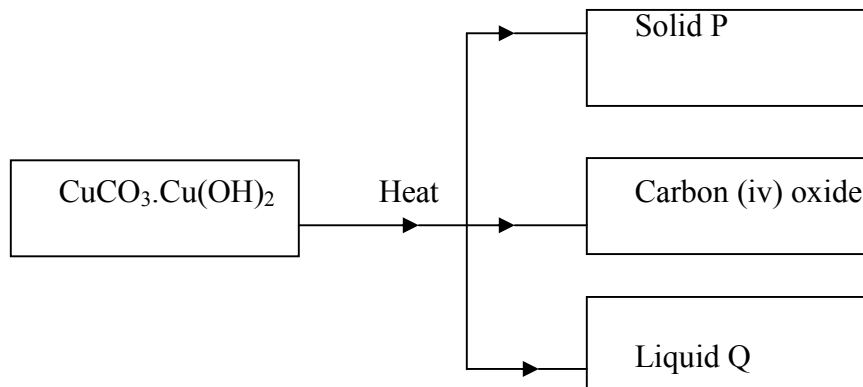
2mks



- Name Use
16. a) Nylon 66 is a condensation polymer whose structure is as follows



- Draw the structures of the two monomers from which nylon 66 is obtained. 2mks
- b) Give one economic importance of Perspex. 1mk
17. a) Using dots (.) and crosses (x) to represent electrons, draw diagrams to represent.
- (i) NH_3 (N=7, H = 1) 1mk
- (ii) NH_4^+ 1mk
- b) State why ammonia molecule NH_3 can combine with H^+ to form NH_4^+ . 1mk
18. The flow chart below shows thermal decomposition of a basic carbonate ($\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$). Study it and answer questions that follow.



- a) Identify solid P

1mk

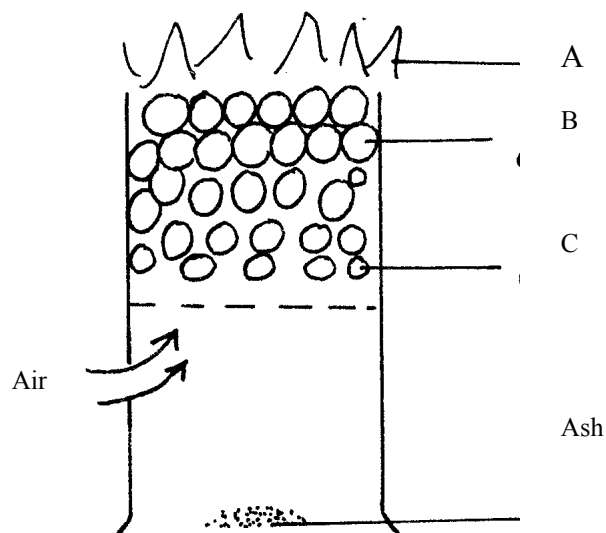
- b) Write an equation for the reaction that lead to formation of liquid Q. 1mk
19. Describe how a sample of a mixture of potassium chloride and lead (II) chloride can be separated into solid samples. 3mks
20. A hydrocarbon has 92.31% carbon and 7.69% hydrogen. Its relative molecular mass is 78.
 (i) Determine the molecular formula of the hydrocarbon. (C=12,H=1) 2 ½ mks
 (ii) Draw its structure. ½ mk
21. Phosphorous (v) chloride fumes in air. Explain this observation using chemical equations 3mks
22. Sodium carbonate is manufactured in large scale in Kenya by Solvay process.
 a) Carbon (iv) oxide is one of the ingredients required in this process. State its source 1mk
 b) One of the by products is calcium chloride which can be used as a source of calcium metal.

Briefly explain how calcium can be obtained from the calcium chloride. 2mks

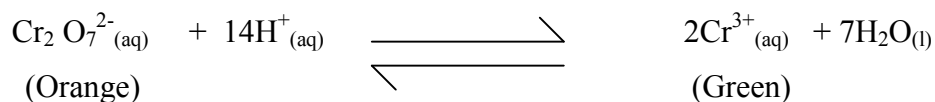
23. 30cm³ of 0.5M HCl was used to neutralize 25cm³ of sodium hydroxide solution. Determine the concentration of sodium hydroxide in grams per litre. (Na = 23, H=1, O=16) 3mks
24. The grid below represents part of the periodic table. Study it and answer the questions that follow

L							O	
P			Q	R			S	
U	V							

- a) Write the electronic arrangements for the ions formed by elements Q and S. 1mk
- b) Compare the melting points of P and U. Explain. 1mk
- c) Select the most reactive non-metal. Give a reason for your answer. 1mk
25. a) State Graham's law of diffusion. 1mk
 b) The rate of diffusion of two gases X and Y is 2:1 respectively. If the mass of gas Y is 16g, calculate the relative molecular mass of gas X. 2mks
26. The diagram below represents a charcoal jiko burning.



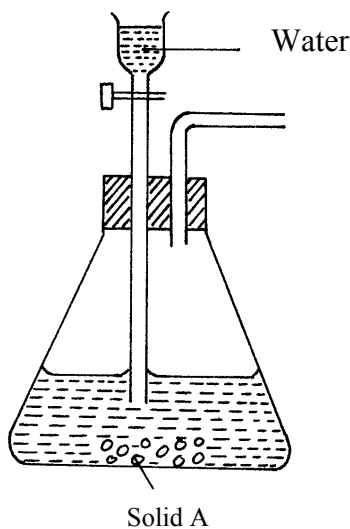
- a) Write the equations for the reactions that occur in regions A and B. 2mks
- b) Explain why it is not advisable to leave a burning jiko overnight in your sleeping room with no ventilation. 1mk
27. A dynamic equilibrium between Chromate(vi) and Chromium (III) ions is as shown below.



State and explain the observation made when dilute sodium hydroxide solution is added to the equilibrium mixture.

3mks

28. The set-up below was used to prepare a sample of oxygen gas. Study it and answer questions that follow.



- a) Complete the above diagram to show how oxygen is collected. 2mks

- b) Identify solid A. 1mk
29. A luminous flame produces more light than a non-luminous flame. Explain. 1mk