

ST. HENRY'S COLLEGE KITOVU
PRE-MOCK EXAMINATIONS 2005
P525/2 CHEMISTRY

PAPER 2

TIME: 2 ½ HOURS

FORM: 6

INSTRUCTIONS:

- *Attempt five questions including three questions from Section A and any two from Section B.*
- *Begin each question on a fresh page.*

SECTION A

Answer three questions from this Section.

1.
 - (a) State what is meant by the term **boiling point constant** of a liquid (2 marks)
 - (b) Describe an experiment that can be used to determine the relative molecular mass of a compound using the method of elevation of boiling point of a liquid. Draw a labelled diagram of apparatus. (12 marks)
 - (c) Explain why the method you have described in (b) is **not suitable** for determination of the relative molecular mass of ethanoic acid in aqueous solution. (3 marks)
 - (d) A solution of 2.8g of Cadmium (II) iodide in 20g of water boiled at 100.2°C at normal pressure. Calculate the relative molecular mass of cadmium (II) iodide and comment on your result. (The boiling point elevation constant for water is 0.52°C per mole per 1000g) (3 marks)
2.
 - (a) Name the pair(s) of functional groups that can be distinguished using the following reagents. In each case, state what would be observed if each member of the pair is separately treated with the reagent.
 - (i) Ammoniacal silver nitrate. (6 marks)
 - (ii) Iron(III) chloride (3 marks)
 - (b) Write equations to show how the following compounds can be synthesized:
 - (i) Propanone from ethanol (3 marks)
 - (ii) Ethyne from ethanol (5 marks)
 - (iii) C₆H₅CH(OH)CH₃ from C₆H₅CH₂CH₂Br (3 marks)
3.
 - (a) Explain why fluorine shows some different in its properties from the rest of the elements (chlorine, bromine and iodine) of the periodic table. (3 marks)

(b) State the differences between the chemistry of fluorine and the rest of the elements of Group (VII) of the periodic Table. (8 marks)

(c) Write equations to compare the reactions of fluorine and chlorine when they react separately with

(i) water (1½ marks)

(ii) cold dilute sodium hydroxide (3 marks)

(iii) hot concentrated sodium hydroxide (3 marks)

(d) Write equation for the reaction between hydrofluoric acid and silicon dioxide.

4. (a) (i) Define ‘**Standard electrode potential**’ (2 marks)
(ii) Why is it not possible to measure standard electrode potential absolutely? (2 marks)
(iii) Discuss the factors which affect the value of standard electrode potentials.

(b) Describe a standard hydrogen half cell. (2 marks)

(c) How would you measure standard electrode potential of a metal in a solution of its ions? (3 marks)

(d) $\text{Ca}^{2+}(\text{aq}) + 2\text{e} \longrightarrow \text{Ca}(\text{s}) \quad E_{\theta} = -2.87\text{V}$

$\text{Mg}^{2+}(\text{aq}) + 2\text{e} \longrightarrow \text{Mg}(\text{s}) \quad E_{\theta} = -2.37\text{V}$

A cell was set up as below:

$\text{Mg}(\text{s}) / \text{Mg}^{2+}(\text{aq}) // \text{Ca}^{2+}(\text{aq}) / \text{Ca}(\text{s})$

(i) Calculate the e.m.f of the cell (2 marks)

(ii) What conclusion can you draw from your e.m.f. value in (d) (i) above. (3 marks)

SECTION B

Attempt any two questions from this section

5. (a) Write the name and formula of one ore from which aluminium can be extracted and describe how aluminium is extracted. (8 marks)
- (b) Write equations and state the conditions under which aluminium reacts with:
- (i) air, (2½ marks)
 - (ii) sodium hydroxide (2½ marks)
 - (iii) hydrochloric acid (2½ marks)
- (c) State what is observed and write equation for the reaction which takes place when aqueous ammonia is added drop wise to a solution containing aluminium ions.
- (2½ marks)
- (d) Write equation for the reaction that takes place when aluminium chloride is dissolved in water. (1½ marks)
6. Write equations to show how the following compounds can be synthesized:
- (a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CO}_2\text{H}$ from propan-1-ol (4 marks)
 - (b) $\text{CH}_3\text{CH}_2\text{CH}_3$ from 1-bromobutane (4 marks)
 - (c) $\text{C}_6\text{H}_5\text{C}=\text{C}(\text{CH}_3)$ from $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{OH}$ (6 marks)
 - (d) $(\text{CH}_3)_2\text{C}=\text{N}-\text{NH}-\text{C}_6\text{H}_4-\text{NO}_2$ from propane (3 ½ marks)
 - (e) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$ from benzene (2 ½ marks)
7. (a) Ores of copper may be concentrated using two methods; leaching or flotation.
- (i) Explain the process of flotation and leaching as used in the extraction of copper. (8 marks)

- (ii) Name **one** ore of copper in each case, which can be concentrated using the above methods. (2 marks)
- (iii) Outline the process by which the impure copper is obtained from the concentrated ore. (6 marks)
- (b) State what would be observed and write equations for the reactions that take place when potassium iodide solution is added to copper (II) ions followed by sodium thiosulphate solution. (4 marks)
8. (a) Describe how nitric acid :
- (i) is manufactured, (9 marks)
- (ii) can react with copper (your answer should include equations for the reaction) (5marks)
- (b) State why nitric acid is **not** used to acidify potassium manganate (VII) in volumetric analysis. (2 marks)
- (b) 1.07 g of a nitrogen containing compound was boiled with excess sodium hydroxide to produce ammonia. The ammonia produced neutralized 200 cm³ of a 0.1 M monobasic acid. Calculate the percentage by mass of nitrogen in the compound. (N=14,H =1) (3 marks)
- (d) State two industrial uses of nitric acid. (1 marks)

END