

S.5 TERM 2 CHEMISTRY HOLIDAY WORK

INSTRUCTIONS

Attempt all questions

1. The boiling points and the atomic numbers of group VII elements in the periodictable are given in the table below.

Element	Fluorine	Chlorine	Bromine	Iodine
Boiling point (°C)	-188	-34.7	58.8	184.0
Atomic number	9	17	35	53

i) Draw a graph to show how the boiling points of the elements of the elements vary with atomic number (03 marks)

ii) Explain the shape of your graph (2½ marks)

(b) Describe the reaction of group VII elements with sodium hydroxide (10 marks)



(Your answer should include conditions and equations)

b) Explain how silver nitrate can be used to distinguish chloride, bromide and iodide ions. (4½ marks)

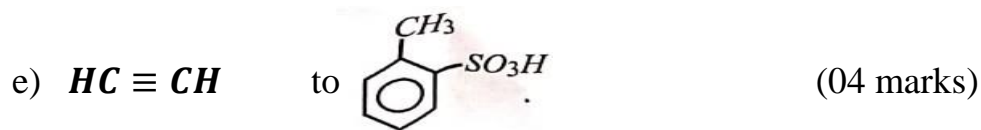
2. Write equations to show how the following conversions can be effected, indicatereagents and condition for the reaction in each case.

a) $\text{CH}_3\overset{\text{O}}{\parallel}\text{CCH}_3$ to $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$. (5½ marks)

$\text{CH}_3\text{CH}_2\text{I}$ to $\text{CH}_3\text{CH}_2\text{COOH}$. (2½ marks)

 $\text{CH}_2\text{CH}_2\text{OH}$ to  $\text{C}\equiv\text{CCH}_2\text{CH}_3$. (5½ marks)

$\text{CH}_3\overset{\text{Br}}{\text{CH}}\text{CH}_2\text{CH}_3$ to $\text{CH}_3\overset{\text{O}}{\parallel}\text{CCH}_2\text{CH}_3$. (2½ marks)



3. (a) Define the term **partition coefficient**. (01 mark)

(b) Describe how the partition coefficient for iodine between tetrachloromethane and water can be determined. (06 marks)

(c) 50cm^3 of a solution containing 0.966g of iodine in tetrachloromethane was shaken with 50cm^3 of water.

(i) Calculate the amount of iodine that remained in the tetrachloromethane layer. [$K_D = 85.25$]. (04 marks)

(ii) Explain how your answer in (c)(i) would be affected if the iodine solution in the tetrachloromethane was shaken with aqueous potassium iodide instead of water. (3½ marks)

(d) Cobalt(II) ions form a complex, $\text{Co}(\text{NH}_3)_n$ with ammonia. The table below shows the result of partition of ammonia between 0.1M Cobalt(II) sulphate solution and trichloromethane.

$[\text{NH}_3]_{(0.1\text{M } \text{CoSO}_4)}$	0.72	0.94	1.19	1.43	1.70	1.92
$[\text{NH}_3]_{\text{CHCl}_3}$	0.01	0.03	0.05	0.07	0.09	0.11

(i) Plot a graph of $[\text{NH}_3]_{(0.1\text{M } \text{CoSO}_4)}$ against $[\text{NH}_3]_{\text{CHCl}_3}$ (03 marks)

(ii) Determine the value of n in the complex, $\text{Co}(\text{NH}_3)_n$. (2½ marks)