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## **S6 CHEMISTRY**

### **Exam 14**

#### ***PAPER 2***

**DURATION: 2 HOUR**

#### INSTRUCTIONS TO THE CANDIDATES

Attempt any four numbers

1. (a) Describe the extraction of aluminium from a named ore. (10marks)
  - (b) Write equations to show the reaction between
    - (i) aluminum and sodium hydroxide (2marks)
    - (ii) aluminium oxide and sodium hydroxide (2marks)
  - (b) Aluminium reacts with chlorine to form a compound of molecular mass; 267.
    - (i) Write equation between aluminium and chlorine (1mark)
    - (ii) Draw the structure of the product in (b)(i) indicating the types of bonds in it. (2marks)
  - (c) State and explain what is observed when a few drops of aluminum chloride solution are added to sodium carbonate solution. (3marks)
2. (a) Chromium and iron are transition elements.

State three properties of transition elements (1½ mark)

(b) The atomic numbers of chromium and iron are 24 and 26 respectively

(i) Write the electron configuration of chromium and iron atoms (2mark)

(ii) State why iron (III) compounds are more stable than iron (II) compounds (1marks)

(c) Using equations to illustrate your answer, describe how chromium reacts with:

(i) water (2½ mark)

(ii) dilute hydrochloric acid (2marks)

(d) State what would be observed and write equations for the reactions that would take place when sodium hydroxide solution is added dropwise until in excess to aqueous solution of

(i) chromium (III) sulphate (4marks)

(ii) iron (II) sulphate (4marks)

(e) Write equation to show how iron (II) chloride can be converted to iron (III) chloride. (1mark)

(f) A solution of sodium hydrogen carbonate was added to aqueous iron (III) chloride. Write equation for the reaction that took place. (2marks)

3. (a) Define the term *osmotic pressure* (2 marks)

(b) (i) Describe an experiment to determine the molecular mass of a substance using osmotic method (5marks)

(ii) State any two assumption in (b)(i) (2marks)

(c) The osmotic pressure of various concentration of a solute in methylbenzene at 20°C are given in the table below


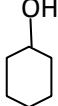
Conc. g/dm <sup>3</sup>	1.0	2.0	3.0	4.0	5.0	6.0
Osmotic pressure/Nm <sup>-2</sup>	23	37	53	75	92	109

(i) Plot a graph of osmotic pressure against concentration (5marks)

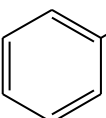
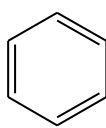
(ii) Use the graph you have drawn to determine the molecular mass X (R =8.314JK<sup>-1</sup>mol<sup>-1</sup>) (4 marks)

(d) Explain why the freezing point depression method is not suitable for determining the molecular mass of a polymer (2mks)

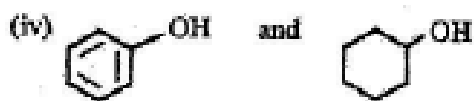
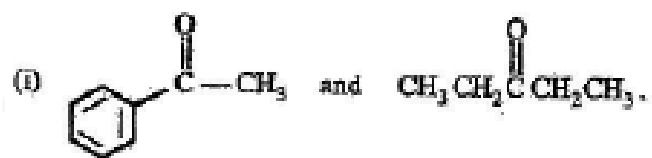
4. complete the following equations and in each case outline the mechanism for the reaction

- a)  $\text{CH}_3\text{CH}=\text{CHCH}_3 \xrightarrow{\text{Br}_2/\text{H}_2\text{O}}$  (4marks)
- b)  +  $\text{CH}_3\text{I} \xrightarrow{\text{AlCl}_3}$  (4marks)
- c)  $\text{RCHO} + \text{H}_2\text{N-OH} \xrightarrow{\text{H}^+}$  (5½ mark)
- d)  $\text{CH}_3\text{CHBrCH}_2\text{Br} \xrightarrow{\text{CH}_3\text{CH}_2\text{O}^-\text{Na}^+/\text{CH}_3\text{CH}_2\text{OH, heat}}$  (3marks)
- e)  + Conc.  $\text{H}_2\text{SO}_4, \xrightarrow{\text{heat}}$  (3½ marks)

5. Write equation to show how the following compounds can be synthesized

- a)  from sodium benzoate (4 marks)
- b)  from benzene (5 marks)
- c) Cyclohexene from phenol (4 marks)
- d)  $\text{CH}_3\text{CH}(\text{Br})\text{CH}_2\text{Br}$  from 2-methylpropene (4marks)
- e) Propanoic acid from propene (3marks)

6. For each of the following pairs of compounds:



Name one reagent which

(a) when reacted with each member of the pair will show similar observation. (8marks)

(b) can be used to distinguish between the members of each pair.

In each case state would be observed when each member of the pair is reacted with the reagent you have

named

**END**