SEMINAR QUESTIONS:

1. (a) (i) Outline with aid of equation , how a dry sample of hydrogen chloride can be prepared in the laboratory from sodium chloride(Diagram **not** required but your answer should include a reason for the method of collection.) (4½marks)

(ii) Name a reagent that would used to test for hydrogen chloride and state what would be observed if hydrogen chloride was tested with the reagent that you have named. (2mark)

(iii) Write equation for the reaction to explain the observation which you have stated in a(ii) above. (1½marks)

(b) Hydrogen chloride can not be dried using calcium oxide. Give a reaction for your answer. (1mark)

(c) Hydrogen chloride can be synthesized directly without causing an explosion

(i) Write equation for the reaction leading to direct synthesis of hydrogen chloride. (1½marks)

(ii) Explain why the reaction in (i) is called a direct synthesis.

(1mark)

(d) State what would observed and write an ionic equation for the reaction that would occur if a solution containing hydrogen carbonate ions was added to a solution hydrogen chloride in:

(i) water (2½marks)

(ii) methylbenzene. (1mark)

2. (a) (i) Briefly describe how a dry sample of copper(II) nitrate can be obtained from copper(II) oxide. (5marks)

(ii) Write an equation for the reaction. (1½marks)

(b) State what would be observed and write an equation for the reaction that took place when:

(i) copper(II) nitrate was heated strongly. (2½marks)

(ii) dilute sodium hydroxide solution was added drop-wise to an aqueous solution of copper(II) nitrate until the alkali is in excess.

(2½marks)

(c) To separate portions of copper(II) hydroxide was added .

(i) warm dilute sulphuric acid

(ii) excess aqueous ammonia solution.

In each case state what would be observed and explain your observations. (3½marks)

3. Under suitable conditions, oils and fats can used to make soap.

(a) (i) Define the term soap and give an example of it. (1½marks)

(ii) State the word which means formation of soap. (½mark)

(b) Name one

(i) locally available material in each case which is a source of oil and fat. (1mark)

(ii) substance which when reacted with oil or fat can produce soap.(1mark)

(c) Describe briefly how

(i) soap solution can be prepared in the laboratory using oil or fat from the source you have named in (b) (i) and the substance you have named in (b)(ii). (2marks)

(ii) a sample of solid soap can be obtained from the solution you have prepared in (c(i). (2marks)

(d) Soap solution was shaken separately with a sample of

(i) rain water

(ii) water in which calcium hydrogen carbonate has been dissolved.

In each case state what would be observed and write equation if any for the

reaction that took place. (3mark)

(e) A synthetic detergent can be obtained from petroleum products.

(i) Briefly outline how a synthetic detergent is prepared. (equation **not** required) (2marks)

(ii) State **one** advantage and **one** disadvantage of using a synthetic detergent over ordinary soap. (2marks)

4. The table below shows the loss in mass of lead(II) carbonate varying with time when two separate equal amounts of lead(II) carbonate powder were reacted with **1M** nitric acid and **1M** hydrochloric acid. The two experiments were started at the same time.

Time (s)	0	20	40	60	80	100	120	130	140	150	160	170
Loss in mass of $PbCO_3$ with HNO_3	0	0.46	0.85	1.11	1.26	1.34	1.38	1.38	1.38	1.38	1.38	1.38
Loss in mass of $PbCO_3$ with HCl	0	0.30	0.57	0.83	1.04	1.20	1.30	1.34	1.35	1.36	1.38	1.38

(a) On the same axes , plot graphs for the loss in mass against time of lead(II) carbonate with nitric acid and hydrochloric acid.(6marks)

(b) Comment on the shapes of the two graphs. (4marks)

(c) Calculate the maximum volume of carbon dioxide produced by each of the two experiments. (2marks)

(d) Determine the time taken for each experiment to produce the maximum volume of carbon dioxide. (1marks)

(e) State and explain how the reaction between lead(II) carbonate and 1M hydrochloric acid can produce the maximum volume of carbon dioxide at the same time as that of lead(II) carbonate and 1M nitric acid.(2marks)

5. (a) Describe an experiment to show how surface area can affect the rate of reaction

between calcium carbonate and 2Mhydrochloric acid. Your answer should include

- a labelled diagram of apparatus
- sketch of expected graphs
- mention of how graphs can be used to reach conclusions.

(11½marks)

(b) Briefly explain why when a 4M hydrochloric acid was used instead of the 2M acid , the rate of reaction was faster. (2½marks)

(c) State one factor other than those mentioned above that can affect the rate of the reaction between hydrochloric acid and calcium carbonate. (1mark)

6. (a) Carbon dioxide gas can be prepared in the laboratory from hydrochloric acid and solid **Y**.

(i) Name **Y.** (½mark)
(ii) State the conditions for the reaction (1mark)
(iii) Write equation for the reaction (1½marks)
(iv) Explain why solid **Y** can **not** be lead(II) carbonate (2marks)

(b) Carbon dioxide gas was bubbled through calcium hydroxide solution for a long time.

(i) State what was observed. (1mark)

(ii) Write equations for the reactions that took place. (3marks)

(c) 8.0g of a solid mixture of anhydrous sodium carbonate and lead(II) carbonate was heated strongly until there was no change in mass and allowed to cool. The volume of gas that evolved was 480cm^3 measured at room temperature.

(Pb = 207 , Na= 23 , C = 12 , O = 16 , 1 mole of a gas occupies 24dm^3 at room temperature.)

(i) State what was observed. (1½marks)
(ii) Write equation for the reaction that took place. (1½marks)
(iii) Calculate the percentage of lead(II) carbonate in the mixture. (2marks)

(d) Distinguish between permanent hard water and temporary hard water. (1mark)

7. (a) (i) Describe how a dry sample of oxygen can be prepared in the laboratory from sodium peroxide.(Diagram **not** required) (4marks)
(ii) Write equation for the reaction. (1½marks)

(b) State what would be observed and write equation for the reaction that take place when the following were plunged into a gas jar of oxygen.
(i) hot iron (2½marks)
(ii) burning sulphur. (2½marks)

(c) Write equation for the reaction that took place when iron(II) carbonate was heated strongly in air. (1½marks)

(d) During the manufacture of oxygen on a large scale from air , water vapour and carbon dioxide are removed before the process of isolating oxygen from the air.

(i) What name is given to the process? (1mark)
(ii) Explain why water vapour and carbon dioxide are required from the air. (1marks)
(iii) Explain the principle for the isolation of oxygen from the air. (1mark)

8. Describe how members of each of the following pairs of ions can be differentiated (Your description should include name of one reagent that can be used in each case , brief procedure , observation(s0 and where possible explanation of any reaction that takes places
(a) lead(II) and aluminium ions (5½marks)
(b) hydrogencarbonate and carbonate ions (5marks)
(c) chloride and iodide ions (4½marks)

END