FORM 3 CHEMISTRY WEEKEND PAPER1

24/06/2021

1.(a)When a non-luminous flame is not in use it should be turned into a luminous flame. Explain why (2 marks)

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(b) Why does a non-luminous flame not produce soot? (1 mark)

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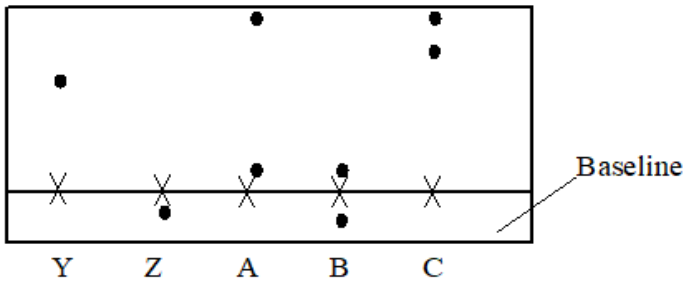
2. A sample of urine from the students A, B and C suspected to have taken illegal drugs were spotted onto a chromatography paper alongside two from illegal drugs Y and Z. A chromatogram was run using methanol. The figure below shows the chromatogram.



(a) Identify the student who had used an illegal drug (1 mark)

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(b) Which illegal drug is less soluble in methanol (1 mark)

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(c) Indicate on the diagram the solvent front. (1 mark)

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3. Zinc metal was reacted with dilute Sulphuric (VI) acid and concentrated Sulphuric (VI) acid.

(a) Write an equation for each reaction. (2 marks)

(i)

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(ii)

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(b) Give a chemical test that can be done to identify the gas produced from the concentrated acid and zinc metal. (1mark)

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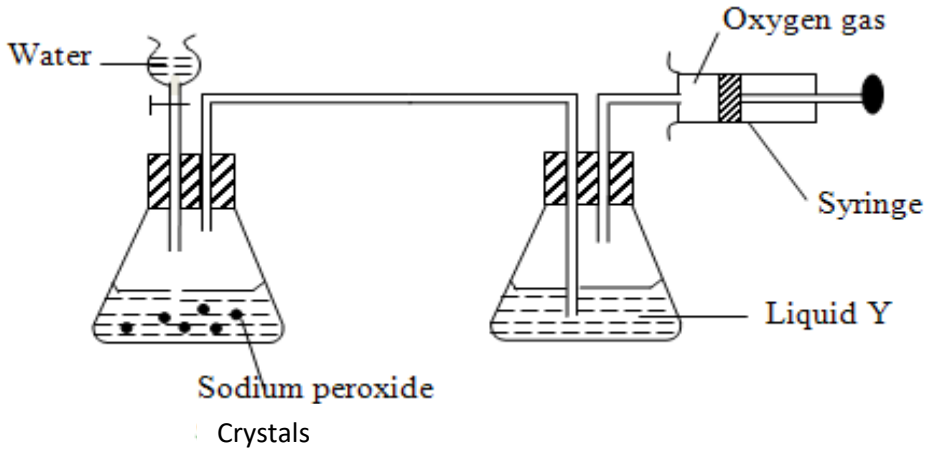
4. A student prepared oxygen gas and intended to collect it when dry. He used the set up below. Study it and answer the questions that follow.



(i) Identify liquid Y. Give a reason for your answer (1mark)

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(ii) Write the equation for the reaction in the first flask. (1mark)

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(iii) Give two ways in which the reaction rate could be increased. (1mark)

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5. Sulphur element was heated in a hard test-tube to a temperature of 160C. The test tube could be inverted without the sulphur liquid pouring out.

(i) State the colour observed (1mark)

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(ii) Explain what happens to the sulphur such that it could be turned upside down without pouring out at 160^0C. (2 marks)

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6. A nitrate salt was heated in a hard glass test tube. It completely decomposed into gaseous products without leaving any residue.

   (i) Identify the nitrate. (1 mark)

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   (ii) Give an equation for the decomposition of the nitrate. (1mark)

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   (iii) State two physical properties of the nitrogenous gas produced. (1mark)

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7. $40cm^3$ of chlorine gas and $60cm^3$ of hydrogen gas were mixed and exposed to sunlight.

   (a) Find the total volume of the resulting gas mixture. (2 marks)

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   (b) When the resulting mixture was shaken with Sodium Hydroxide solution the volume reduced. What is the volume of the residual gas? (1 mark)

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8. Lead (VI) oxide was reacted with concentrated hydrochloric acid, which was heated.

   (i) Write an equation for the above reaction. (1 mark)

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   (ii) Suppose Manganese (IV) oxide was used instead of Lead (IV) Oxide in the above reaction, what condition is necessary for the reaction to proceed? (1mark)

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   (iii) Where would the above reaction be carried out and why? (1mark)

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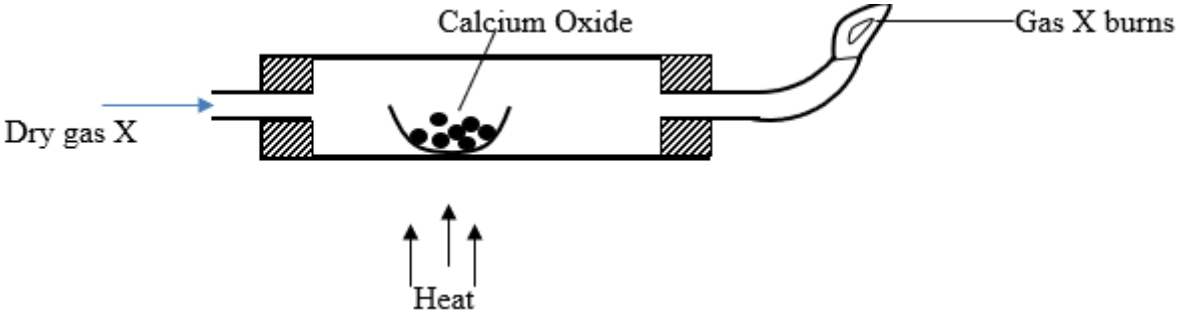
9. A gas X which burns with a blue flame and burns with a pop sound once tested with burning splint was passed over heated Calcium Oxide as shown below.



(i) Identify gas X (1mark) (1mark)

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(ii) Was there any reaction between gas X and Calcium Oxide? Give a reason for your answer.

(1mark)

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(iii) Write the expected equation for the reaction between gas X and heated Copper (II) Oxide (1mark)

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10. The table below shows the atomic numbers, mass numbers and numbers of electrons in atoms/ions P,Q,R and S. The letters are not actual symbols of the elements.

Atom/Ion	P	Q	R	S
Atomic number	12	14	12	13
Mass number	24	25	26	27
Number of electrons	12	13	13	13

(a) Which two elements are isotopes? Explain your answer. (1mark)

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(b) Which is an anion from the table? Give a reason for your answer? (1mark)

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(c) How many neutrons are in an atom of S? (1mark)

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11. Both Chlorine and Iodine are halogens.

(a) What are halogens (1mark)

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(b) In terms of structure and bonding, explain why the boiling point of chlorine is lower than that that of Iodine. (2 marks)

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12. Two elements of P and R have atomic numbers 4 and 16 respectively.

(i) Using a dot (•) and cross (X) to represent the outermost electrons, draw a diagram to show the bonding between P and R. (2marks)

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(ii) (a) What type of bonding does the resulting compound have? (½mark)

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(b) What structure does the above compound have? (½mark)

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13. Ethene undergoes self-addiction reactions to form a compound P.

(i) Identify compound P (1mark)

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(ii) State one problem of continued use of compound P on the earth. Give a reason for your answer. (2marks)

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14. (a) Describe how the following reagents can be used to prepare Lead (III) Sulphate solid. Sodium Sulphate, Lead (II) Carbonate, dilute Nitric acid and distilled water. (2marks)

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(b) Which ionic equation that produced Lead (II) Sulphate in the above reactions. (1mark)

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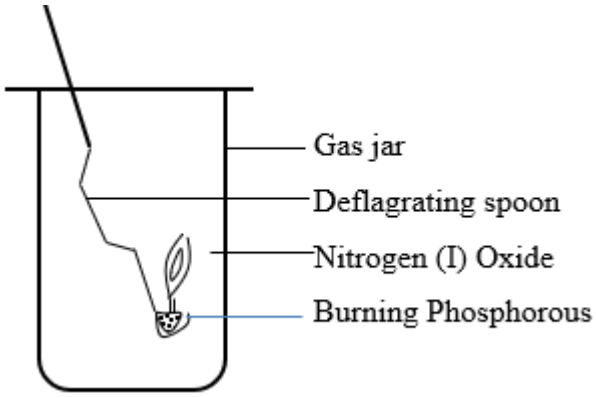
15. The set-up below shows how small pieces of red Phosphorous are heated in Nitrogen (II) Oxide.



(a) Write an equation for the reaction which occur in the gas jar? (1mark)

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(b) Give the uses of Nitrogen (I) Oxide (1mark)

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16. (a) Compare the reactivity of fluorine with that of chlorine elements. (2 marks)

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(b) Compare the atomic radii of fluorine with that of chlorine. Give reason for your answer. (1mark)

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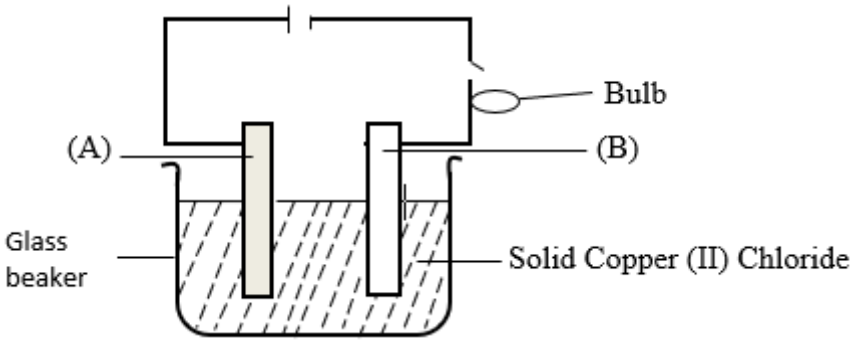
17. An electric current was passed through a binary electrolyte as shown below. Study it and answer the questions that follow.



(i) Identify the anode and cathode in terms of (A) and (B) (1mark)

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(ii) State a condition missing in the set up to make the bulb to light. (1mark)

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(iii) Give the equation for the reaction at electrode (A). (1mark)

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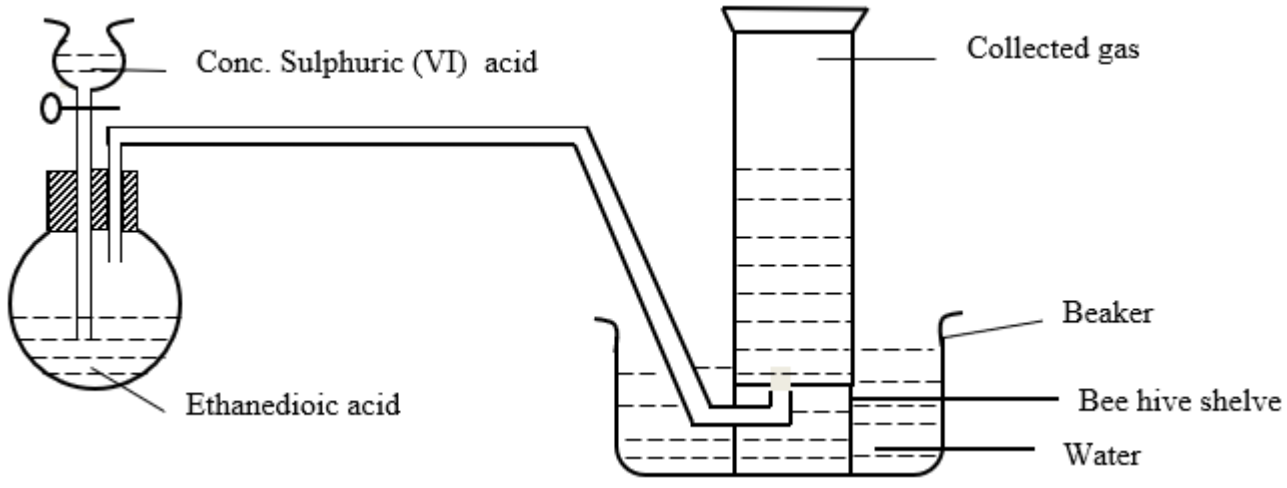
18. A student wanted to prepare Carbon (II) Oxide gas using the set up below.



(i) Will the method give him pure Carbon (II) Oxide gas? Give a reason for your answer based on the set up shown. (2 marks)

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(ii) Write the equation for the above reaction. (1mark)

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19. The rate of diffusion of hydrogen gas is 6 times that of a certain alkane W.

(i) Calculate the relative molecular mass of the alkane (R.A.M of C = 12, H = 1) (2 marks)

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(ii) Work out the molecular formula of the alkane (1mark)

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20. 0.24g of a divalent metal M dissolve in $50cm^3$ of 0.25M Sulphuric (VI) acid. The resulting solution required $5.0cm^3$ of 1.0M Sodium Hydroxide for complete neutralism. Determine the relative atomic mass of M. (3 marks)

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21. Copper metal powder was thoroughly mixed with the same amount of Zinc (II) Oxide. The mixture was heated together strongly, in a bottle top. State the observations made when the mixture was hot and after cooling. Was there any reaction between the two chemicals? Give a reason for your answer. (3marks)

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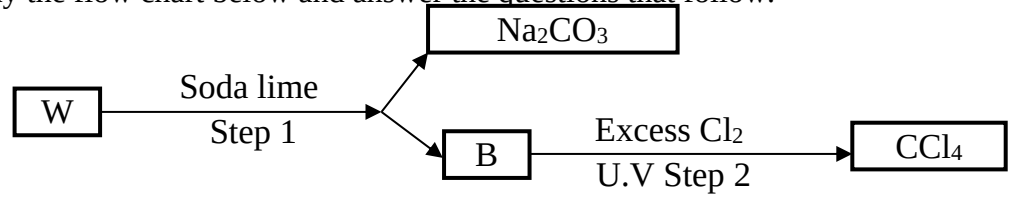
22. Study the flow chart below and answer the questions that follow.



(a) Identify W and B. (2marks)

W ……

B ……

(b) What name is given to the type of halogenation/chlorination reaction in Step 2. (1mark)

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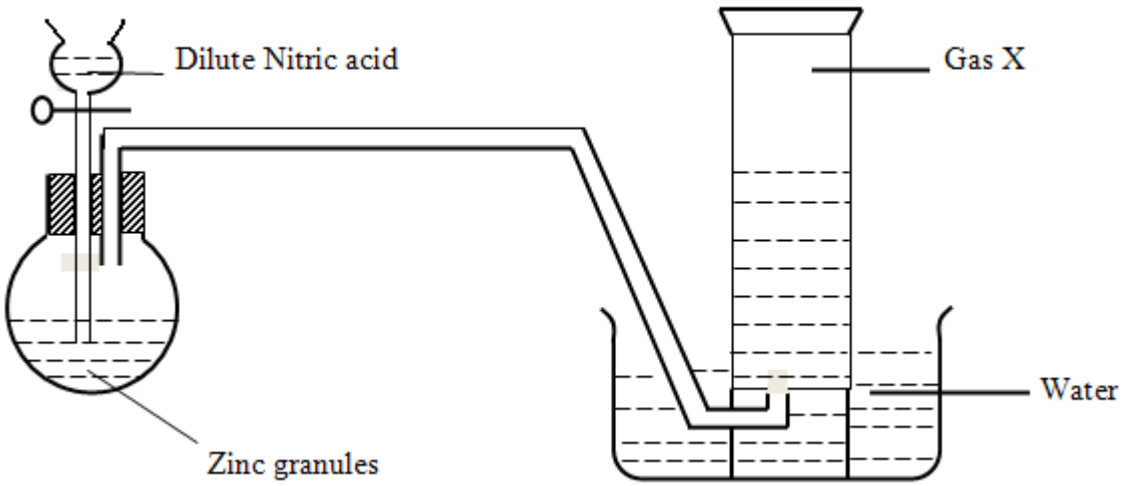
23. In an experiment, 50% concentrated Nitric (V) acid (50% concentrated acid mixed with 50% water) by volume was reacted with Zinc metal in a round bottomed flask as shown below. The gas evolved was collected over water.



(i) Identify gas X (1mark)

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(ii) Write an equation for the formation of gas X (1mark)

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(iii) State two physical properties of gas X (1mark)

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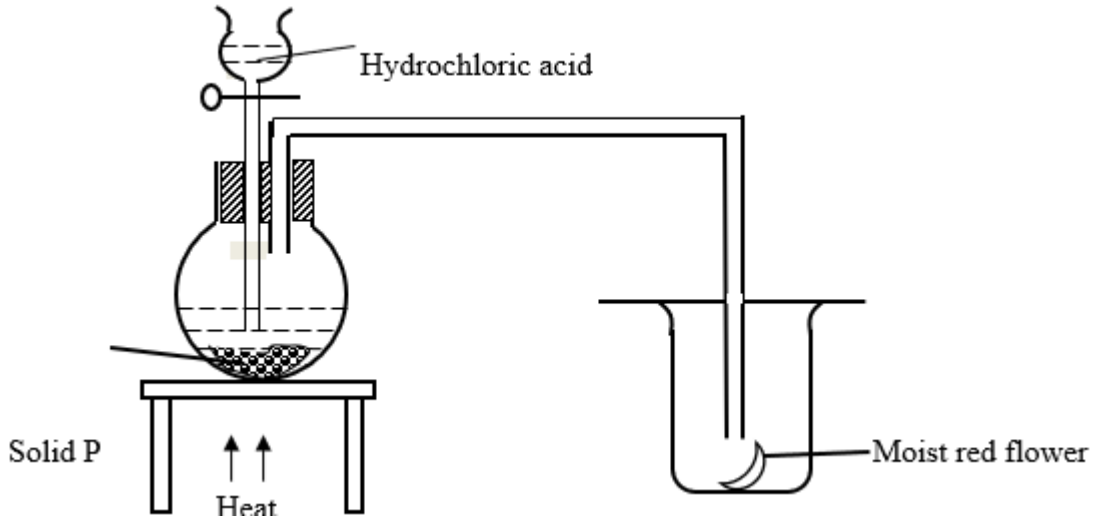
24. The diagram below shows the set up that was used to prepare and collect Sulphur (IV) Oxide gas.



(a) Identify solid P. (1 mark)

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(b) (i) Why is it possible to collect Sulphur (IV) Oxide as shown. (1mark)

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(ii) What happened to the red flower. (1mark)

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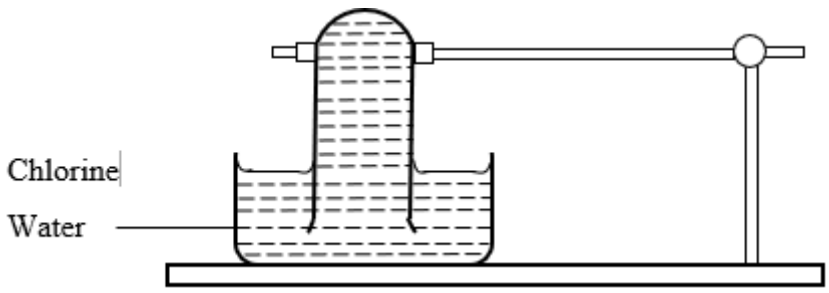
25. In an experiment, a test tube full of chlorine water was inverted in chlorine water as shown in the diagram below and the set up left in the sunlight for one day.



After one day, a gas was found to have collected in the test-tube.

(a) Identify the gas. (1mark)

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(b) What will happen to the PH of the solution in the beaker after one day? Give an explanation (2marks)

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26. A broken metallic door piece made of Iron and Aluminium was dissolved in excess dilute hydrochloric acid. The resulting Iron (II) ions were titrated with $20cm^3$ of 0.4 Molar Potassium Manganate (VII) solution. If the original mass of the piece was 2.8g, determine the percentage of Al in it given the ionic equation below. (3 marks)

(Fe = 56, Al = 26)

$5Fe^{2+}_{(aq)} + MnO_4^-{}_{(aq)} + 8H+_{(aq)} \quad 5Fe3+_{(aq)} + Mn2+_{(aq)} + 4H_2O_{(l)}$

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27. A blue solid was heated in a hard glass test tube. It decomposes giving out a black residue and releasing A colourless gas. The colourless gas evolved forms a white precipitate with a drop of lime water on a glass rod at the mouth of the test tube. The black residue was dissolved in dilute hydrochloric acid to give a blue solution.

(i) Identify the blue solid (½mark)

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(ii) Identify the colourless gas (½mark)

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(iii) Write the equation for thermal decomposition of the blue solid. (1mark)

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(iv) State the observations that would be observed incase ammonia solution was added into 2 cm^3 of the blue solution as follows.

(a) Three drops (½ mark)

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(b) Excess ammonia solution (½ mark)

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