CHEMISTRY

1 $2

1. Which one of the following elements reacts with nitrogen when heated?
A. Copper.
B. Zinc
C. Sulphur.
D. Magnesium.

2. The reaction in which vegetable oil is changed to margarine is called
A. dehydration
B. hydrogenation.
C. hydration.
D. saponification.

3. Ethene was bubbled through a solution of bromine in tetrachloromethane. The structure of the compound formed is

4. Element X belongs to group II in the Periodic Table. The formula of the oxide of X is

A. XO   B. X_2O

C. X_2O_3 D. XO_2.

5. The mass of potassium hydroxide, KOH, contained in $250cm^3$ of 0.01 M of potassium hydroxide solution is (K = 39, H = 1, O = 16)

A. 0.056g   B. 0.140g

C. 0.280g   D. 0.560g.

6. Which one of the substances underlined in the equations below is being reduced.

A. $PbO_{(s)} + H_{2(g)} \rightarrow Pb_{(s)} + H_2O_{(l)}$

B. $2SO_{2(g)} + O_{2(g)} \rightarrow 2SO_{3(g)}$

C. $H_2S_{(g)} + Cl_{2(g)} \rightarrow S_{(s)} + 2HCl_{(g)}$

D. $2NH_{3(g)} + 3CuO_{(s)} \rightarrow 3Cu_{(s)} + 3H_2O_{(l)} + N_{2(g)}$

7. The number of particles in the nuclei of atoms Q, R, S and T are shown in the table below.

Atom	Number of particles	
	protons + neutrons	neutrons
Q	40	20
R	40	22
S	45	24
T	45	25

Which of the atoms are isotopes?
A. Q, and R.   B. Q and T.
C. R and S.   D. S and T.

8. A salt P reacted with concentrated sulphuric acid to give a colourless gas which   fumed in moist air. The anion in P is likely to be a
A. nitrate.   B. chloride.
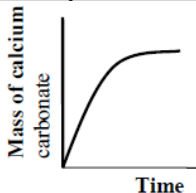C. sulphite.   D. carbonate.

9. The breakdown of starch into Glucose when heated in solution with dilute acid is known as

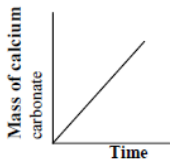A. dehydration   B. fermentation

C. hydrolysis   D. hydrogenation

10. Which one of the graphs below shows the change in mass of calcium carbonate with time when it is reacted with hydrochloric acid?
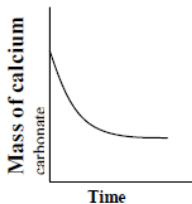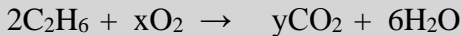

A. (i)   B. (ii)

C. (iii)   D. (iv).

11. The reaction in which ethanol is changed to ethene when ethanol is reacted with excess concentrated sulphuric acid is called
A. hydrogenation.   B. neutralisation.
 C. hydration.   D. dehydration.

12. Ethane burns in oxygen according to the following equation
$2C_2H_6 + xO_2 \rightarrow yCO_2 + 6H_2O$
The values of x and y in the equation are
A. x = 2 and y = 2,   B. x = 7 and y = 6,
C. x = 7 and y = 4,   D. x = 4 and y = 6.

13. Which one of the following anions will react with silver nitrate solution to give a white precipitate soluble in excess aqueous ammonia?
A. Cl^- B. NO_3^-
C. SO_4^{2-} `D. CO_3^{2-}

14. Which one of the following oxides would dissolve in excess aqueous ammonia and excess dilute sodium hydroxide solution?
A. FeO   B. ZnO

C. CuO   D. PbO.
15. 10g of a saturated sodium chloride solution was

evaporated and 6g of solid sodium chloride was left. The solubility of sodium chloride is
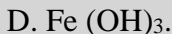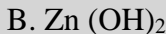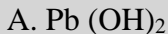
A. $\left(\dfrac{6\times100}{10}\right)$g　　　B. $\left(\dfrac{6\times100}{4}\right)$g

C. $\left(\dfrac{6\times100}{16}\right)$g　　　D. $\left(\dfrac{10\times100}{16}\right)$g

16. Which one of the following hydroxides can be prepared by reacting a soluble salt of the metal with excess sodium hydroxide solution?

A. $Pb(OH)_2$　　　B. $Zn(OH)_2$
C. $Al(OH)_2$　　　D. $Fe(OH)_3$.

17. A compound X contains Fe, 72.4% and O, 27.6%. (Fe = 56; O = 16). The empirical formula of X is given by the ratio.

A. $\left(\dfrac{72.4}{72}\right)$: $\left(\dfrac{27.6}{72}\right)$

B. $\left(\dfrac{72.4}{56}\right)$: $\left(\dfrac{27.6}{16}\right)$

C. $\left(\dfrac{72.4\times56}{100}\right)$: $\left(\dfrac{27.6\times16}{100}\right)$

D. $\left(\dfrac{56}{72.4}\right)$: $\left(\dfrac{16}{27.6}\right)$

18. Which of the following salts is normally prepared by precipitation?
A. Calcium carbonate.
B. Sodium sulphate.
C. Zinc chloride.
D. Ammonium chloride.

19. Spring water decomposes on boiling to produce white solid particles. The solid particles are
A. Calcium carbonate.
B. Calcium hydrogen carbonate
C. Calcium sulphate
D. Calcium hydrogen sulphate.

20. Excess lead powder was shaken with an aqueous solution containing a mixture of copper (II) nitrate and magnesium nitrate. The cations present in the solution after the reaction were
A. Pb^{2+}, Cu^{2+} and Mg^{2+}
B. Pb^{2+}, and Cu^{2+} only.
C. Mg^{2+} and Cu^{2+} only.
D. Pb^{2+} and Mg^{2+} only.

21. Chlorine was exposed to sunlight as shown in the diagram below.
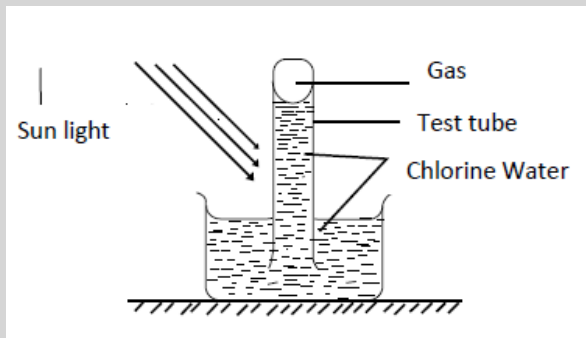
The gas collected in the test tube was
A. chlorine.   B. hydrogen chloride.
 C. oxygen.   D. hydrogen.

22. A separating funnel is used in the laboratory to separate
A. sand from water.
B. sulphur from iron.
C. water from ethanol.
D. water from paraffin.

23. In the laboratory preparation of chlorine, concentrated hydrochloric acid is heated with
A.Manganese(iv)oxide
C. sodium chloride crystals
B. copper (ii)chloride crystals

D. lead(ii)oxide

24. Which one of the following gases turns moist potassium dichromate paper green?
A. Hydrogen.
B. Sulphur dioxide.
C.Hydrogen chloride.
D. Carbon dioxide.

25. Which one of the following is not a property of ethene?
A. Ethene turns potassium permanganate colourless.
B. Ethene has a double bond between carbon atoms.
C. Ethene undergoes addition reaction with bromine.
D. Ethene dissolves in water to form a basic solution.

26. When heated strongly, potassium nitrate decomposes according to the following equation
$$2KNO_{3(s)} \rightarrow 2KNO_{2(s)} + O_{2(g)}$$
The volume of oxygen at s.t.p. that can be obtained by heating 5g of potassium nitrate is
($K = 39$, $O = 16$, $N = 14$; 1mole of gas occupies
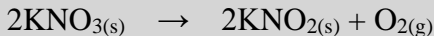
22.4 1 at s.t.p.)

A. $\left(\dfrac{22.4 \times 5}{202}\right)$ litres   B. $\left(\dfrac{5 \times 202}{22.4}\right)$ litres

C. $\left(\dfrac{22.4 \times 5}{101}\right)$ litres   D. $\left(\dfrac{5 \times 101}{22.4}\right)$ litres

27. Which one of the following pairs of substances will react to form hydrogen?
A. Copper and dilute sulphuric acid.
B. Magnesium and dilute hydrochloric acid.
C. Copper (II) carbonate and dilute sulphuric acid.
D. Sodium sulphite and dilute hydrochloric acid.

28. Which one of the following cations would form a yellow precipitate when reacted with aqueous potassium iodide?
A. Ca^{2+} (aq)   B. Zn^{2+} (aq)
C. Fe^{2+} (aq)   D. Pb^{2+} (aq)

29. Sodium ethanoate. CH_3COONa, was dissolved in water. The resultant solution
A. bleached litmus paper.
C. changed red litmus paper blue.
B. had no effect on litmus paper
D. changed blue litmus paper red.

30. Carbon burns in oxygen according to the following equation $C + O_2 \rightarrow CO_2$.
The heat energy obtained when 480g of carbon is burnt completely is (The molar heat of combustion of carbon is 2.2×10^{-7} kJ mol^{-1}; C = 12)
A. 8.8×10^{-5} kJ.   B. 8.8×10^{-6} kJ
    C. 8.8×10^{-7} kJ   D. 4.4×10^{-6} kJ

31. Metal M was dissolved in dilute nitric acid and the solution was evaporated to dryness and then heated strongly until there was no further change. The residue was yellow when hot and white on cooling. M is
A. Zinc.   B. Lead.
C. aluminium.   D. Iron.

32. Air contains mainly
A. carbon dioxide.   B. oxygen
C. nitrogen.   D.water vapour.

33. Two gases which are evolved on heating copper (II) nitrate are
A. oxygen and nitrogen.
B. oxygen and nitrogen dioxide.
C. oxygern and ammonia.
D. ammonia and nitrogen dioxide.

34. When concentrated hydrochloric acid is reacted with potassium permanganate, the gas given off is
A. chlorine.
B. hydrogen chloride.
C. hydrogen.
D. oxygen.

35. Which one of the following properties is shown by carbon monoxide?
A. it burns with a blue flame.
B. it turns lime water milky.
C. it turns blue litmus red.
D. it is very soluble in water.

**36.** What would be observed if copper turnings were added to zinc sulphate solution?
A. A white precipitate is formed.
B. solution turns blue.
C. copper is coated with zinc.
D. solution remains colourless.

37. Which of the following solutions would give the maximum volume of carbon dioxide within the shortest time when reacted with 10g of calcium carbonate at room temperature?

A. 30cm^3 of 2M HCl
B. 60cm^3 of 1M HCl
C. 40cm^3 of 2M HCl
D. 50cm^3 of 1M HCl

38. Excess hydrochloric acid was reacted with 1.95g of zinc powder. The reaction proceded according to the equation.

$$Zn_{(s)} \; + \; 2HCl_{(aq)} \; \rightarrow \; ZnCl_{2(aq)} + \; H_{2(g)}$$
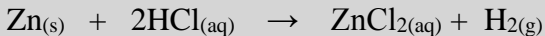
The maximum volume of hydrogen in cm^3 which was evolved at s.t.p. was

A. 672   B. 224
C. 448   D. 892
(Zn = 65: molar volume = 22400cm at s.t.p)

39. When element X and Y are heated together they form a compound with the formula X_3Y_2.

Elements X and Y have the following electronic structures respectively.

A. 2.8.1 and 2.5   B. 2.8.2 and 2.4
C. 2.8.1 and 2.6   D. 2.8.2 and 2.5

Each of the questions 40 to 43 consists of an assertion (statement) on the left hand side and a reason on the right hand side. Select.
A. *if both assertion and reason re true statements*

and the reason is a correct explanation of the assertion.
B. *if both assertion and reason are true statements but the reason is not a correct explanation of the assertion.*
C. *if the assertion is true but the reason is an incorrect statement.*
D. *if the assertion is incorrect but the reason is a true statement*

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		Instructions Summarised	
	Assertion	Reason	
A.	True	True(Reason is a correct explanation)
B.	True	True(Reason is not a correct explanation)
C.	True	Incorrect
D.	True	True statement

40. When liquid air is distilled oxygen comes off before nitrogen.	because	nitrogen boils at a lower temperature than oxygen.
41. When hydrogen is passed over heated copper(II) oxide there is no chemical change.	because	hydrogen is higher than copper in the activity series.
42. During formation of chloride ion the chlorine atom attains the electronic configuration of a noble gas.	because	noble gases have stable configurations.
43. Solid lead (II) bromide conducts electricity	because	the ions of solid lead (II) bromide are not able to move.

In each of the questions 44 to 50 one or more of the Answers given may be correct. Read each question carefully and then indicate on your Answer sheet according to the following.

A. if 1, 2, 3 only are correct.
B. if 1, 3 only are correct.
C. if 2, 4 only are correct.
D. if 4 only is correct

Instructions summarised			
A	B	C	D
1,2,3 Only correct	1,3 Only correct	2,4 Only correct	4 Only correct

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44. Which of the following substances will sublime

when heated?
1. ammonium chloride.
2. iron (III) chloride.
3. iodine
4. sulphur.

45. Which of the following gases will bleach moist litmus paper?
1. oxygen
2. chlorine
3. carbon dioxide.
4. sulphur dioxide.

46. During electrolysis f copper (II) sulphate solution using copper electrodes.
1. copper is deposited at the cathode.
2. oxygen is evolved at the anode.
3. the anode dissolves.
4. the cathode dissolves.

47. Which of the following substances will dissolve in water to give a solution that will change blue litmus paper red?
1. sodium ethanoate.
2. ammonium chloride.
3. magnesium oxide.

4, carbon dioxide.

48. Which of the following substances is / are decomposed by electric current?
1. solution of urea
2. aqueous sodium chloride.
3. molten wax.
4. molten lead (II) bromide.

49. Which one of the following when in aqueous solution can e reduced by aluminium metal?
1. Fe^{2+} 2. Ca^{2+} 3. Cu^{2+} 4. Mg^{2+}

50. Which of the following substances would undergo permanent changes when strongly heated?
1. Iodine
2. Sugar.
3. Potassium carbonate.
4. Potassium chlorate.

PAPER 2 1987
SECTION A

1. (a) 5.0g of calcium carbonate was heated strongly until there was no further change.
(i) Write equation for the reaction.

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(ii) Calculate the mass of solid left.

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(b) The residue in (a) was shaken with water and the product tested with blue litmus paper.
State what was observed.

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(Ca = 40, C = 12, O = 16)

2. Hydrogen chloride reacts with silver ions according to the equation

$HCl(g) + Ag^+(aq) \rightarrow AgCl(s) + H^+(aq)$
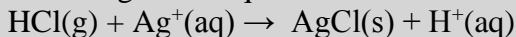
1.2 litres of hydrogen chloride was carefully bubbled through 500cm^3 of 1.0 M solution of silver ions at room temperature.

Calculate

(a) the number of moles of silver ions that reacted.

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(b) the number of moles of hydrogen chloride bubbled. (1 mole of gas occupies 24 litres at room temperature).

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(c) the mass in grams of silver chloride formed (Cl = 35.5, Ag = 108).

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3. The structure of an organic substance A is shown below.

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        H    OH
        |    |
  H —  C — C  —  H
        |    |
        H    H
```
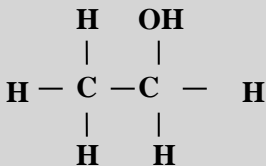
(a) Name A.

…………………………………………………………
………

 (b) A reacts with excess concentrated sulphuric acid at 170°C to form an organic product B.
(i) Name B.

…………………………………………………………
………

 (ii) Write the structure of B.

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…………………………………………………………
………

(iii) Name one reagent that could be used to detect the presence of B.

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………

………………………………………………………
………

(iv) State what would be observed if the reagent named in (iii) was used.

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4. A concentrated solution of sodium chloride was electrolyzed using platinum electrodes.

(a) (i) State what was observed.

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………

(ii) at the cathode.

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(b) Explain your observation in (a) (i).

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(c) Litmus paper was dipped into solution after the electrolysis. State what was observed.

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5. The result of paper chromatography experiment is shown in the diagram below.
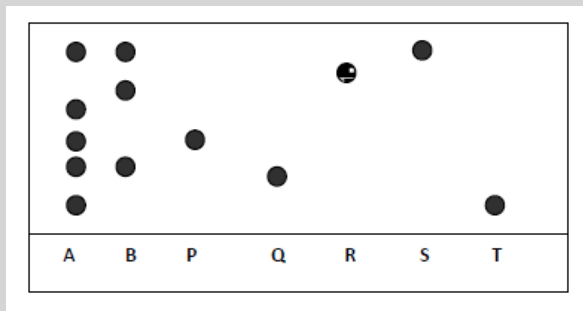
A and B are different mixtures of some of the pure substances, P, Q, R, S and T.
(a) Identify the substances in the
(i) mixture A.

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....
 (ii) mixture B.

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(b) Which substances are present in both mixtures?

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(c) Which substances are present in mixture A only?

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6. (a) Explain what is meant by the terms

 (i) 'mass number'?

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(ii) 'atomic number'?

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(b) An atom of an element is represented by the symbol $_{35}^{80}X$

(i) State the mass number of the atom.

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………

 (ii) What is the atomic number of the atom?

………………………………………………………

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 (iii) How many neutrons are present in the atom?

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7. (a) A given mass of magnesium strips was reacted with dilute hydrochloric acid at room temperature. The volume of the gas produced was measured at various intervals.

 (i) Write equation for the reaction.

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 (ii) Sketch a graph to show variations of the volume of the gas produced with time.

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 (b) State what would be observed if the same mass of magnesium powder was used instead of the strips. Give one reason for your Answer.

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8. Nitric acid is manufactured by catalytic oxidation of ammonia.

(a) Name

(i) two raw materials, other than ammonia that are used in the manufacture of nitric acid.

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....

(ii) the catalyst used.

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(b) Write equation for the reason between nitric acid and ammonia.

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(c) State one use of the product in (b).

....
....
....

9. The positions of the elements A, B, C,D, E and F are shown in the periodic table below. These letters are not the usual symbols for the elements.

(a) State the type of bonding in the compound formed between

(i) B and D.

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………………………………………………………
…………

 (ii) E and C.

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 (b) (i) Which one of the elements A and B reacts vigorously with cold water?

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(ii) Write equation for the reaction between water and the element you have named in (b) (i)

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………………………………………………………

 (c) From the table select two elements that can oxide F.

………………………………………………………
………………………………………………………

10. A circuit was connected as shown in the diagram below and a steady current of 0.20 amperes was passed for 20 minutes. (1 faraday = 96

500, C mol^{-1}; Cu = 64)
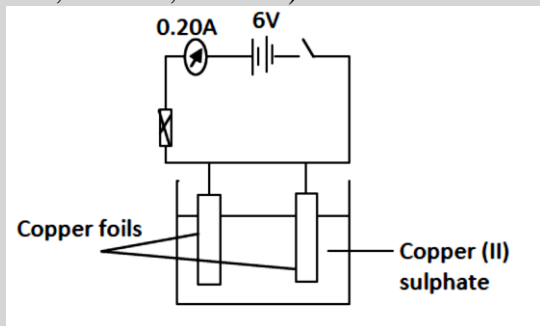
(a) Write equation for the reaction that took place at the cathode.

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(b) Calculate

(i) the number of coloumbs of electricity used.

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(ii) the number of moles of electricity.

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(iii) the mass of substance formed at the cathode.

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SECTION B

Attempt all questions in this section.

11. (a) Define 'allotropy'

 (b) Give one example on an element other than carbon which shows allotropy and name its allotropes

Allotropes of sulphur are Rhombic, Monoclinic.

(c) (i) Describe briefly the structure of graphite.

 (ii) State the properties of graphite.

 (d) Describe how you would show by a chemical test that graphite is made up of carbon atoms.

12. (a) In sewage treatment, the sewage is brought into contact with appropriate bacteria under controlled conditions.

(i) Explain what is meant by the term 'sewage'.

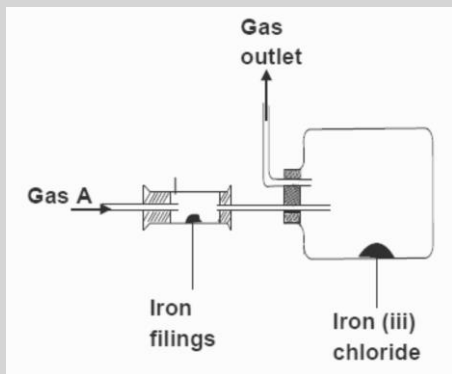 (ii) Explain the role of bacteria in sewage treatment.

 (iii) State the conditions under which bacteria will be active during the treatment of sewage.

 (b) Distinguish between a 'sludge' and an

'effluent' in relation to sewage treatment.
(c) State two uses of sewage sludge.

13. The diagram below shows the apparatus which can be used to prepare anhydrous iron (III) chloride.

(a) (i) Name the gas A.
(ii) State the conditions for the reaction between iron fillings and gas A.
(iii) Describe what would be observed during the reaction.
(iv) Write equation for the reaction.
(b) Describe how you would prepare pure crystals of iron (II) chloride in the laboratory.

14. Carbon dioxide gas can be prepared in the laboratory by reacting an acid with a carbonate.

(a) Write an ionic equation for the reaction.

(b) Draw a labeled diagram of the apparatus that can be used in the laboratory to prepare and collect a sample of carbon dioxide.

(c) Write equations to show how carbon dioxide reacts with each of the following and state what would be observed in each case;

(i) sodium hydroxide solution.

(ii) calcium hydroxide solution.

(iii) Magnesium metal.

(d) Name one process in each case by which the concentration of carbon dioxide in the atmosphere is

(i) increased.

(ii) decreased.