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SERERE TOWNSHIP SECONDARY SCHOOL
HOLIDAY PACKAGE 2020
RESOURCEFUL QUESTIONS
CHEMISTRY
PAPER 1
S.4
Time:1½hrs

INSTRUCTIONS TO CANDIDATES:

This paper consists of **50** *multiple choice questions.*

Answer **all** *questions.*

You are required to write the correct answer, **A**, **B**, **C** or **D** *in* **blue** *or* **black** *ink in the box provided on the right-hand side of each question.*

Do **not** *use pencil. Any questions answered in* **pencil** *will* **not** *be marked.*

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Turn Over

1. The substance formed when little sodium chloride is stirred in plenty of water is called a
   A. suspension.
   B. solvent.
   C. solution.
   D. solute.

2. Which one of the following processes is used in the conversion of oil into fat?
   A. Saponification.
   B. Dehydration.
   C. Hydrogenation.
   D. Polymerisation.

3. Which one of the following substances when mixed with water conducts electricity?
   A. Kerosene.
   B. Hydrogen chloride.
   C. Glucose.
   D. Carbon tetrachloride.

4. Which one of the following alloys can be used for making surgical blades?
   A. Brass.
   B. Bronze.
   C. Solder.
   D. Steel.

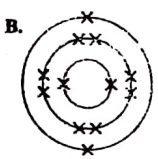
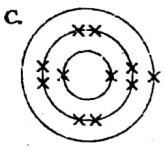
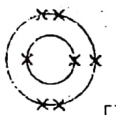
5. A mixture of iron and sulphur was heated. Which one of the following is true about the product?
   A. The product is soluble in water.
   B. The product reacts with acids to produce hydrogen sulphide.
   C. The product reacts with acids to produce hydrogen.
   D. Components of the product can be separated using a magnet.

6. Which one of the following processes increases the amount of nitrogen in the atmosphere?
   A. Photosynthesis.
   B. Haber process.
   C. Respiration.
   D. Denitrification.

7. Which one of the following zinc salts is an insoluble salt?
   A. $ZnCO_3$.
   B. $ZnSO_4$.
   C. $ZnCl_2$.
   D. $Zn(NO_3)_2$.

9. The similarity between sulphur(IV) oxide and carbon dioxide is that both
A. are reducing agents.
B. turn lime water milky.
C. dissolve in water to form acids.
D. turn potassium dichromate solution green.

9. The atomic number of element E is 5. The electronic structure of an element Q which belong to the same group in the Periodic Table is

A. 
B. 
C. 
D. 

10. Which one of the following is used as a catalyst during the laboratory Preparation of oxygen?
A. Iron.
B. Platinum.
C. Manganese(IV) oxide.
D. Vanadium(V) oxide.

11. Which one of the following acids, when in a dilute solution will have a pH of about 1 ?
A. Citric acid.
B. Ethanoic acid.
C. Carbonic acid.
D. Hydrochloric acid.

12. Which one of the following statements is true about equal volumes of oxygen and carbon dioxide under the same temperature and pressure? The two gases
A. have equal number of molecules.
B. have equal masses.
C. have equal density.
D. move at the same speed.

13. The table below shows the atomic numbers, number of electrons and mass numbers of particles Q, R, X and Y.

Table 1

Particle	Atomic number	Number of electrons	Mass number
Q	19	18	39
R	8	8	16
X	9	10	18
Y	6	6	12

Which one of the particles is a cation?
A. R.
B. X.
C. Q.
D. Y.

14. The atomic number of an element Z is 12. What is the atomic number of element W which is immediately below Z in the same group in the Periodic Table?
A. 14.
B. 11.
C. 13.
D. 20.

15. Which one of the following gases is produced when iron(II) sulphide is treated with dilute hydrochloric acid?
A. Hydrogen chloride.
B. Sulphur dioxide.
C. Hydrogen sulphide.
D. Chlorine.

16. Which one of the following reactions takes place in the absorption tower during the manufacture of nitric acid?
A. $4NO_2(g) + 2H_2O(l) + O_2(g) \longrightarrow 4HNO_3(aq)$.
B. $NH_3(g) + H_2O(l) \longrightarrow NH_4OH(aq)$.
C. $2NO_2(g) + H_2O(l) \longrightarrow HNO_3(aq) + HNO_2(aq)$.
D. $4NO(g) + 2H_2O(l) + 3O_2(g) \longrightarrow 4HNO_3(aq)$.

17. Lead(II) nitrate solution reacted with a colourless solution Q to form a yellow precipitate. Which one of the following is the anion in Q?

A. I^-
B. Cl^-
C. SO_4^{2-}
D. CO_3^{2-}

18. Which one of the following equations shows formation of hardness in water?

A. $Ca(HCO_3)_2(aq) \longrightarrow CaCO_3(s) + CO_2(g) + H_2O(l)$.
B. $CO_2(g) + Mg(OH)_2(aq) \longrightarrow MgCO_3(s) + H_2O(g)$.
C. $CaCO_3(s) \longrightarrow CaO(s) + CO_2(g)$.
D. $CO_2(aq) + MgCO_3(s) + H_2O(l) \longrightarrow Mg(HCO_3)_2(aq)$.

19. The full symbol of the atom of an element X is $^{27}_{13}X$. What is the number of neutrons in the atom of X?

A. 13.
B. 14.
C. 27.
D. 40.

20. Which one of the following reactions, that occurs during the manufacture of sulphuric acid by the contact process requires a catalyst?

A. $H_2SO_4(l) + SO_3(g) \longrightarrow H_2S_2O_7(l)$.
B. $H_2S_2O_7(l) + H_2O(l) \longrightarrow 2H_2SO_4(aq)$.
C. $2SO_2(g) + O_2(g) \longrightarrow 2SO_3(g)$.
D. $S(s) + O_2(g) \longrightarrow SO_2(g)$.

21. Which one of the compounds contains the highest percentage by mass of nitrogen?

(H =1; C = 12; N =14; O =16; P = 31; S = 32)

A. NH_4NO_3.
B. $(NH_4)_2CO_3$.
C. $(NH_4)_3PO_4$.
D. $(NH_4)_2SO_4$.

22. Which one of the following nitrates when heated will decompose to form oxygen as the only gaseous product?

A. $AgNO_3$.
B. $Zn(NO_3)_2$.
C. $Ca(NO_3)_2$.
D. KNO_3.

23. A solution of hydrogen chloride in methylbenzene has no effect on litmus paper. This is because hydrogen chloride

A. forms a monobasic acid.
B. does not form ions in methylbenzene.
C. dissolves to form a dilute acid solution.
D. is immiscible with methylbenzene.

24. Magnesium carbonate reacts with dilute hydrochloric acid according to the following equation:

$MgCO_3(s) + 2HCl(aq) \longrightarrow MgCl_2(aq) + H_2O(l) + CO_2(g)$

Which one of the following is the mass of magnesium carbonate that would react completely with 100 cm^3 of a 2M hydrochloric acid?

(H =1; C = 12; O = 16; Mg = 24; Cl = 35.5)

A. $\left(\frac{2\times100\times2}{1000\times84}\right)$g
B. $\left(\frac{100\times84}{2\times1000\times2}\right)$g
C. $\left(\frac{2\times100\times84}{1000\times2}\right)$g
D. $\left(\frac{2\times1000\times2}{100\times84}\right)$g

25. Methanol (CH_3OH) burns in air according to the following equation

$$CH_3OH(l) + \frac{3}{2}O_2(g) \longrightarrow CO_2(g) + 2H_2O(l) \quad \Delta H = -726 \text{ kJmol}^{-1}$$

What would be the amount of heat produced when 20 g of methanol is burnt?

A. $\left(\frac{726\times2}{32}\right)kJ.$

B. $\left(\frac{726\times2}{20}\right)kJ.$

C. $\left(\frac{20\times32}{726}\right)kJ.$

D. $(726\times20\times32)\,kJ.$

26. The full symbol of atoms of elements X, Y and Z are $^{24}_{12}X$, $^{32}_{16}Y$ and $^{20}_{10}Y$ respectively.
Which one of the following pairs will combine to form a substance with ionic bond?

A. Y and Y.
B. X and Z.
C. Y and Z.
D. X and Y.

27. Element Y liberates hydrogen from cold water, whereas W does not. W liberates hydrogen from dilute hydrochloric acid, whereas X does not. Which one of the following is the correct order of the reactivity of the elements hydrogen, W, X and Y, starting with the most reactive?

A. Hydrogen, W, X, Y.
B. W, X, hydrogen, Y.
C. X, hydrogen, Y, W.
D. Y, W, Hydrogen, X.

28. Ammonia gas reacts with oxygen according to the following equation:

$$4NH_3(g) + 3O_2(g) \longrightarrow 2N_2(g) + 6H_2O(l)$$

The volume of nitrogen gas formed when 60 cm^3 of ammonia gas reacts completely with excess oxygen is

A. 20 cm^3.
B. 30 cm^3.
C. 120 cm^3.
D. 240 cm^3.

29. Which one of the following pairs of substances is used during laboratory preparation of carbon dioxide?

A. Lead(II) carbonate and dilute hydrochloric acid.
B. Lead(II) carbonate and dilute sulphuric acid.
C. Calcium carbonate and dilute hydrochloric acid.
D. Calcium carbonate and dilute sulphuric acid.

30. When a mixture of solid Y and concentrated sulphuric acid was heated, a gas that gave dense white fumes with ammonia was evolved. Which one of the following is the anion in Y?

A. Cl^-
B. NO_3^-
C. S^{2-}
D. CO_3^{2-}

31. Which one of the following substances is produced at the anode when copper(II) sulphate solution is electrolysed using graphite electrodes?

A. Copper(II) ions.
B. Hydrogen.
C. Copper.
D. Oxygen.

32. A hydrocarbon burns in oxygen completely according to the following equation:

$$C_3H_8 + xO_2(g) \longrightarrow yCO_2(g) + zH_2O(l)$$

Which one of the following are the values of x, y and z respectively?

A. 4, 3 and 4.
B. 5, 3 and 4.
C. 4, 5 and 3.
D. 3, 4 and 5.

33. Which one of the following hydrocarbons is formed when a mixture of ethanol and concentrated sulphuric acid is heated?

A. C_2H_6.
B. C_4H_{10}.
C. C_3H_8.
D. C_2H_4.

34. In which one of the following test tubes would a burning splint continue to burn. The test tube containing water and

A. sodium peroxide.
B. sodium sulphite.
C. sodium hydroxide.
D. sodium oxide.

35. When calcium nitrate is strongly heated, it decomposes according to the following equation:

$2Ca(NO_3)_2(s) \longrightarrow 2CaO(s) + 4NO_2(g) + O_2(g)$

Which one of the following is the maximum volume of oxygen produced at room temperature when 2.4 g of calcium nitrate is heated?

(N = 14; O = 16; Ca = 40; 1 mole of gas occupies 24 dm^3 at room temperature)

A. $\left(\frac{164\times2.4}{24}\right)$ dm^3.

B. $\left(\frac{2.4\times24}{164\times2}\right)$ dm^3.

C. $\left(\frac{24\times164}{2.4}\right)$ dm^3.

D. $\left(\frac{2\times164\times2.4}{24}\right)$ dm^3.

36. Which one of the following would be formed when anhydrous copper(II) carbonate is heated?

A. A black solid.
B. A green solid.
C. A blue solid.
D. A brown solid.

37. Iron(III) oxide reacts with carbon monoxide according to the following equation:

$Fe_2O_3(s) + 3CO(g) \longrightarrow 2Fe(s) + 3CO_2(g)$

Which one of the following is the mass of iron obtained when 100 g of iron(III) oxide is reduced?
(C =12; O = 16; Fe =56)

A. $\left(\frac{56\times160}{100}\right)g.$

B. $\left(\frac{56\times100}{160\times2}\right)g.$

C. $\left(\frac{56\times2\times100}{160}\right)g.$

D. $\left(\frac{100\times56}{160}\right)g.$

38. Which one of the following cations forms a precipitate that is soluble in excess sodium hydroxide and aqueous ammonia?

A. Al^{3+}.
B. Zn^{2+}.
C. Pb^{2+}.
D. Cu^{2+}.

39. Which one of the following contains the same number of moles of hydrogen ions as the number of moles of sodium ions in 50 cm^3 of a 0.2M Na_2SO_4?

A. 200 cm^3 of a 0.1M HNO_3.
B. 150 cm^3 of a 0.2M H_2SO_4.
C. 100 cm^3 of a 0.5M HCl.
D. 50 cm^3 of a 1M H_3FO_4.

40. Which one of the following salts when reacted with dilute hydrochloric acid can form a white precipitate that dissolves on heating?

A. $ZnSO_4$.
B. $CuSO_4$.
C. $Ba(NO_3)_2$.
D. $Pb(NO_3)_2$.

Each of the questions 41 to 45 consists of an assertion (statement) on the left-hand side and a reason on the right- hand side.

Select

A. if both the assertion and reason are true statements and the reason is a **correct explanation** of the assertion.

B. if both the 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 **not** a **correct** statement.

D. if the assertion is **not correct** but the reason is a **correct** statement.

INSTRUCTIONS SUMMARISED:

	Assertion	Reason
A	True	True and is a correct explanation.
B	True	True and is **not** a correct explanation.
C	True	Incorrect.
D	Incorrect	Correct.

41.	Diamond and graphite burn in excess oxygen to form carbon dioxide	**because**	they are isotopes of carbon.
42.	When dry ammonia is passed over heated copper(II) oxide, the oxide changes colour from black to brown	**because**	copper(II) oxide contain oxygen atoms.
43.	Elements with atomic numbers 12 and 17 react to form a covalent compound	**because**	the two elements are in the same period in the Periodic Table.
44.	A white precipitate is formed when solutions of lead(II) nitrate and barium chloride are treated separately with sulphuric acid	**because**	metal sulphates do not dissolve in water.
45.	Chlorine is used in treatment of water	**because**	chlorine is an oxidising agent.

In each of the questions 46 to 50, one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following:

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

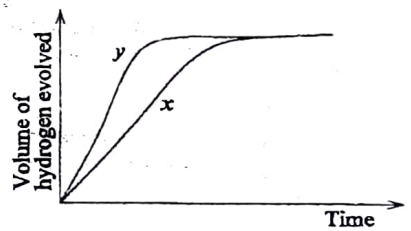
46. During the extraction of sodium from sodium chloride, calcium chloride is added to fused sodium chloride so as to

1. make sodium chloride non-corrosive.
2. make sodium insoluble in its molten sodium chloride.
3. lower the melting point of sodium chloride.
4. remove impurities from the sodium chloride.

47. An atom of element *X* contains 15 electrons and 16 neutrons. Which of the following statements is /are true about *X*.

1. The oxide of *X* is acidic.
2. The atomic number of *X* is 16.
3. *X* is in period 3 of the Periodic Table.
4. *X* is in group VI of the Periodic Table.

48. Curves *x* and *y* in figure 1 were obtained when a fixed mass of magnesium was reacted separately with a certain volume of dilute sulphuric acid.



The condition(s) under which y was obtained is/are by

1. using magnesium ribbon.
2. increasing the concentration of the acid.
3. reducing the reaction temperature.
4. using magnesium powder.

49. Which of the following compounds decolourises bromine water?

1. CH_4.
2. C_3H_8.
3. C_4H_{10}.
4. C_2H_4.

50. Which of the following is/are formed when nitric acid is reacted with a metal oxide?

1. Water.
2. Oxygen.
3. Nitrate of the metal.
4. Nitrogen dioxide gas.

END

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SERERE TOWNSHIP SECONDARY SCHOOL
HOLIDAY PACKAGE 2020
RESOURCEFUL QUESTIONS
CHEMISTRY
PAPER 2
S.4
Time:2hrs

INSTRUCTIONS TO CANDIDATES:

Section **A** *consists of 10 structured questions. Answer* ***all*** *questions in this section.*

Answers to these questions ***must*** *be written in the spaces provided.*

Section **B** *consists of 4 semi-structured questions. Answer any* ***two*** *questions from this section. Answers to the questions* ***must*** *be written in the answer booklet(s) provided.*

In both sections **all** *working must be clearly shown.*

Where necessary use;

[H =1; C = 12; N =14; O = 16; Na =23; S = 32; Cl = 35.5]

1 mole of gas occupies 24 *l* at room temperature.

1 mole of gas occupies 22.4 *l* at s.t.p.

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	**Total**

Turn Over

SECTION A (50 MARKS)
Answer **all** *questions in this section.*

1. (a) Write the chemical name of rust. *(01 mark)*

.....

(b) State the conditions necessary for rusting to occur. *(02 marks)*

.....

.....

(c) Figure 1 shows a set-up of apparatus that was used to investigate a condition necessary for iron nails to rust.

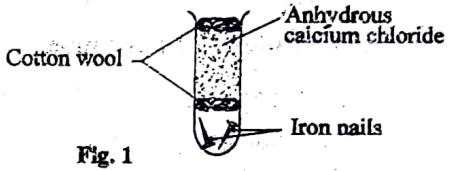

Fig. 1

State the condition that was being investigated. *(01 mark)*

.....

(d) State;

(i) **one** disadvantage of rust. *(01 mark)*

.....

.....

(ii) **one** method of preventing rusting. *(01 mark)*

.....

2. Table 1 shows the mass numbers and atomic numbers of elements W, X and Y. Study the table and answer the questions that follow.

Table 1

Element	Mass number	Atomic number
W	24	12
X	14	7
Y	39	19

(a) State the number of;

(i) electrons in the atom of element *Y*. (*01 mark*)

.....

(ii) neutrons in the atom of element *Y*. (*01 mark*)

.....

(b) Write the electronic configuration of the ion that can be formed by the atom of element *Y*. (*01 mark*)

.....

(c) Identify the group in the Periodic Table to which element ***X*** belongs. (*01 mark*)

.....

(d) Element *W* reacted with element *X* to form a compound *Z*. State the type of bond in *Z*. (*01 mark*)

.....

3. (a) A metallic element *T*, reacts with nitrogen to form a compound with the formula T_3N_2.

(i) State the valency of *T*. (*½ mark*)

.....

(ii) Write equation for the reaction between *T* and chlorine. (*1½ mark*)

.....

.....

(b) 3.2 g of *T* reacted completely with 600 cm^3 of nitrogen at s.t.p. Determine the atomic mass of *T*.
(*1 mole of a gas occupies 22.4 dm^3; T reacts with nitrogen in the ratio 3:1*) (*02 marks*)

.....

.....

.....

.....

4. Clean zinc granules were added to a solution of copper(II) sulphate.

(a) State what was observed. (*01 mark*)

.....

.....

(b) Explain your observation in (a). (*02 marks*)

.....

.....

(c) Write equation to support your answer in (b). (*1½ marks*)

.....

.....

5. Ammonium sulphate dissolves in water according to the following equation:

$$(NH_4)_2SO_4(s)+2H_2O(l)\rightarrow 2NH_4OH(aq)+H_2SO_4(aq)$$

(a) State what would be observed if aqueous sodium hydrogencarbonate was added to the resultant solution. (*01 mark*)

.....

.....

(b) Briefly explain your answer in (a). (*04marks*)

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6. The set-up of the apparatus in figure 2 was used for electrolysing silver nitrate solution.

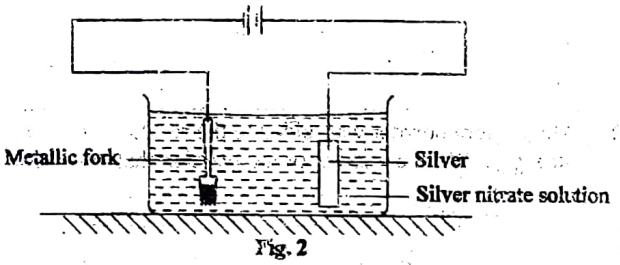

Fig. 2

(a) State what was observed on the;

(i) metallic fork. *(01 mark)*

.....

.....

(ii) silver. *(01 mark)*

.....

.....

(b) Write equation for the reaction that took place at the;

(i) electrode with the fork. *(01 mark)*

.....

.....

(ii) electrode with silver. *(01 mark)*

.....

.....

(c) (i) Name the process taking place at the electrode with the fork. *(½ marks)*

.....

.....

(ii) State **one** use of the process in (c)(i). *(½ mark)*

.....

.....

7. Lead(II) carbonate was heated until there was no further change.

(a) State what was observed. *(1½ marks)*

.....

.....

(b) Magnesium powder was added to the residue and the mixture heated strongly. Write equation for the reaction that took place. *(1½ marks)*

.....

.....

(c) The experiment in (b) was repeated using copper turning instead of magnesium powder.

(i) State what was observed. *(01 mark)*

.....

(ii) Give a reason for your answer in (c)(i). *(01 mark)*

.....

.....

8. When ammonium chloride was mixed with potassium hydroxide and the mixture heated strongly, ammonia was evolved

(a) Write equation for the reaction leading to the formation of ammonia. *(1½ marks)*

.....

.....

(b) Ammonia was bubbled through zinc sulphate solution until there was no further change.

(i) State what was observed. *(1½ marks)*

.....

.....

(ii) Give reason(s) for your observation(s) in (b) (i). *(02 marks)*

.....

.....

.....

.....

9. (a) What is meant by the term **rate of reaction**? *(01 mark)*

.....

.....

.....

(b) During an experiment to determine the rate of production of carbon dioxide from calcium carbonate at room temperature, the volume of carbon dioxide varied with time as shown in the graph in figure **3**.

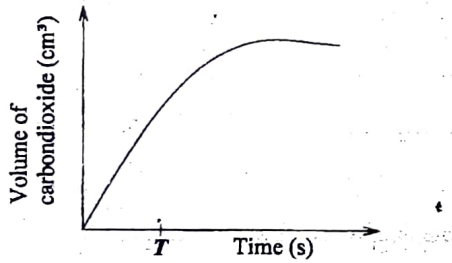

Fig. 3

Show how the rate of the reaction at time ***T*** can be determined. *(02 marks)*

.....

.....

.....

(c) State **two** factors other than temperature that can affect the rate of a reaction. *(02 marks)*

.....

.....

10. (a) Write equation for the complete combustion of carbon. *(1½ marks)*

.....

.....

.....

(b) If **80 kg** of charcoal cost UGX. 20,000. Calculate the cost of charcoal required to produce 163,750 kJ of heat energy.
(C = 12; The enthalpy of combustion of carbon = -393kJmol^{-1}) *(03 marks)*

.....

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(c) **State one** use of charcoal other than fuel. *(½ marks)*

.....

SECTION B (30 MARKS)

Answer any two questions from this section.
Any additional question(s) answered will not be marked.

11. (a) Differentiate between **miscible** and **immiscible liquids.** ***(02 marks)***

(b) (i) Name **two** compounds that can form a **miscible liquid mixture** and draw a diagram for the set-up of **apparatus that can be used** to separate the mixture. ***(04 marks)***

(ii) State **one method** that can be used to **determine the purity** of the components of the mixture in (b)(i). ***(01 mark)***

(c) Table 2 shows variation in temperature with time when a solid **X**, was heated to boiling.

Table 2

Temperature (°C)	25	47	80	80	162	218	218
Time (minutes)	0	1.0	2.5	4.5	7.0	8.7	9.5

(i) Draw a graph of temperature against time. ***(04 marks)***

(ii) Explain the shape of the graph. ***(04 marks)***

12. (a) Chlorine can be prepared in the laboratory by **oxidation** of concentrated hydrochloric acid.

(i) Name **one** suitable substance that can be used for oxidising hydrochloric acid. ***(01 mark)***

(ii) Outline how a pure dry sample of **chlorine can be prepared in** the laboratory from the above reaction. (***Diagram is not required.***) ***(06 marks)***

(b) State and write equation(s) to show how **phosphorous reacts with** chlorine. ***(04 marks)***

(c) Explain the reaction of chlorine with **potassium bromide.** ***(04 marks)***

13. (a) (i) State **two** ways by which water-bodies **can be polluted.** ***(02 marks)***

(ii) Describe how polluted water can be **treated on a large scale so** that it is safe for use. (*Diagram not required.*) ***(6½ marks)***

(b) When soap solution was added to a sample of water, a white precipitate was formed. But when the soap solution was added to another portion of the water that had been boiled, no precipitation took place. Explain. (*Your answer should include equation where possible*) ***(6½ marks)***

14. (a) Using equations only, outline the processes involved in the manufacture of nitric acid. ***(4½ marks)***

(b) A mixture of concentrated nitric acid and sulphur was warmed.
(i) State what was observed. ***(1½ marks)***
(ii) Write equation for the reaction that took place. ***(1½marks)***

(c) Ammonium nitrate is among the most widely used fertilisers. Write equation for the reaction leading to the formation of ammonium nitrate from nitric acid. ***(1½ marks)***

(d) Ammonium nitrate dissolves in water according to the following equation:

$$NH_4NO_3(s) + H_2O(l) \longrightarrow HNO_3(aq) + NH_4OH\,(aq)$$

Excessive use of ammonium nitrate as a fertiliser can cause the soil to become acidic. Explain. ***(2½ marks)***

(d) Write equation to show the effect of heat on;
(i) silver nitrate. ***(1½ marks)***
(ii) potassium nitrate. ***(1½ marks)***

(f) State **one** use of nitric acid other than in the manufacture of fertilisers. ***(½ mark)***