CHEMISTRY THEORY

Date: .. 27 / 06... /2022
Period:.... 8H30-11H30...

END OF TERM III EXAMINATIONS

GRADE / LEVEL: **S1**
OPTION / Ordinary **level**

DURATION: **3 HOURS**

MARKS: **..... /100.....**

INSTRUCTIONS

1. There are 2 sections in this paper:

   Section A (70 marks): Attempt all questions in this section

   Section B (30 marks): Attempt all questions in this section.

2. Do not use periodic tables
3. Non-programmable calculators may be used
4. Answers should be written on blank papers provided
5. Use a blue or black pen only

SECTION A: Attempt all questions in this section (70 marks)

1. a) Chemistry has many applications in daily life. List any two (2) applications of chemistry. (**2 marks)**

   b) Chemistry was applied in traditional Rwanda; Find any two (2) products which were obtained by chemical transformation in traditional Rwanda. (**2 marks)**

2. Choose among the following pieces of laboratory apparatus the most suitable for each of the following activities? **(5 marks**)

(Test tube, Boiling tube, Weighing balance, spatula, Funnel, Measuring cylinder)

(a) Keeping 50 $cm^3$of boiling water

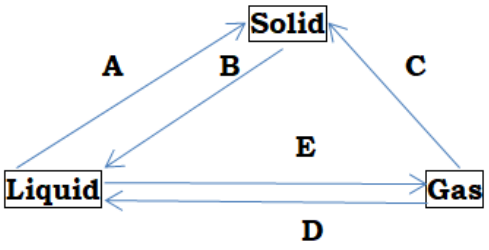
(b) Pouring 50 cm^3 of acid from one container to another.

(c) Measuring exactly 30 cm^3 of water

(d) Removing substances from a reagent bottle

(e) Weighing 100 grams of sodium chloride

3. The diagram below shows the triangle of states of matter.



   a. Name the changes of states labelled by letters **A, B** and **C** **(3 marks)**

   b. State the conditions necessary in order to bring the change of state **E** and **D (2 marks)**

   c. Name any two substances that can undergo change of state labelled **C** **(2 marks)**

4. a) Choose the correct answer **(1 mark)**

Atoms always react because they want to:

(i) Be with other atoms.

(ii) Form molecules

(iii) Attain stable electronic configuration.

(iv) Gain electrons

b). Name the four elements contained in Sodium hydrogen carbonate./**2 marks**

c) Given the positive ion $K^+$and negative ion HSO_4^- , write the formula of the compound that would be formed if the two ions combined. (**1 mark)**

d) Name the compounds formed by $K^+$and HSO_4^- **(1 mark)**

5. An atom X (not its chemical symbol) has atomic number **19**.

(a) How many protons does it have in its nucleus? **(1 mark)**

(b) If its mass number is 39, calculate the number of neutrons in its nucleus **(show your work). (2 marks)**

(c) Does X become stable by gaining or losing electrons? Explain. **(2 marks)**

6. The elements of X and Y have the following atomic numbers, X=8, Y=19.

a) Draw an atomic model of X=8. **(1 mark)**

b) (i) Write the electronic configuration of Y.**(1 mark)**

(ii) To which group does Y belong? Why **(2 marks)**

(iii) To which period does Y belong? Why **(2 marks)**

c) Write down the formula of a compound formed between Y and X. Use Y and X as symbols in the compound. **(1 mark)**

7. a) Translate the following chemical equation into word equation. **(2 marks)**

$Al_2O_3(s) + H_2SO_4(aq) \rightarrow Al_2(SO_4)_3(aq) + H_2O(l)$

b. Give the identities of P,Q and R in the following equations.

i) Sodium + chlorine → P **(1 mark)**

ii)Calcium + Q→ Calcium oxide **(1 mark)**

iii) R + Iodine →Copper iodide **(1 mark)**

8. a) Suggest one indicator you can use to test if a solution is acidic or alkaline.

b) State the colors you will observe in each case (both in acidic and basic solutions) **(3 marks)**

9. The name of various chemicals with their respective pH values in aqueous solutions are shown below

SOLUTIONS	p H
Hydrogen bromide	2
Sodium chloride	7
Magnesium hydroxide	10

a) Which of these substances is **(3 marks)**

i) acids ii) bases iii) neutral substance

b) Write the chemical formula for each substance given in the table above **(3 marks)**

10. a) Give 2 examples of inorganic salts. **(2 marks)**

b) State the positively charged ion and negatively charged ion in sodium chloride **(2 marks)**

c) Give two uses of Sodium Chloride **(2 marks)**

11. a) Define: **(1 mark)** and give an example **(1 mark)**

i. A pure substance
ii. A mixture

b) State one method that can be used to separate a homogeneous mixture **(1 marks)**

c) State the easiest method one could use to obtain the substance shown from the following mixtures: **(2 marks)**

i) NaCl from a mixture of NaCl and water

ii) Petrol from a mixture of water and petrol.

12. Atoms are said to be neutral. Design an atomic model of Oxygen atom (Z=8) and predict the origin of neutrality of oxygen atom. **(4 marks)**

13. a) Write the chemical equation of thermal decomposition (decomposition by heat) of the following salt: **(3 marks)**

-Calcium nitrate decomposes into Calcium oxide and Carbon dioxide

b) Classify the following among soluble salts and insoluble salts: $CaSO_4$, $CuSO_4$, **(2 marks)**

14. a) What do you understand by 'air pollution' ? **(1 mark)**

b) State any two air pollutants. **(2 marks)**

SECTION B: Attempt All 6 questions in this section (30 marks)

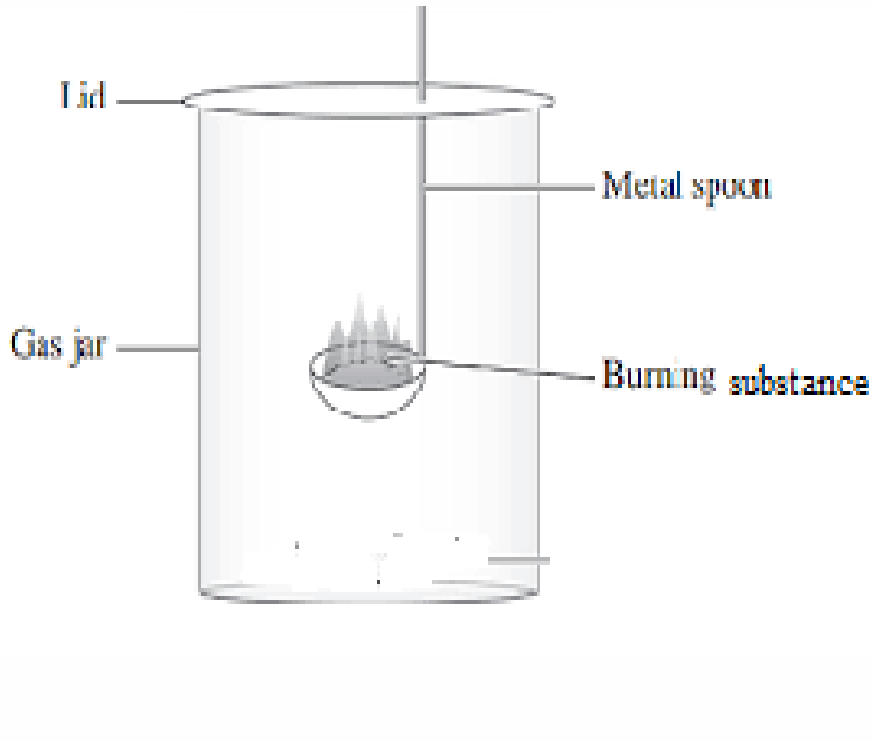
15. An analysis of atmospheric air in an industrial zone showed the following results

Elements	Atmospheric air composition in industrial zone (%)	Normal atmospheric air composition (%)
Nitrogen	78	78
Oxygen	17	21
Carbon dioxide	3	0.03
The remaining elements	2	0.97

Compare the results found in the industrial zone and the result of normal atmospheric air composition.

Is the area (zone) polluted or not. WHY. **(5 marks)**

16. Different substances are lowered in a gas jar of oxygen as shown below



a) State the product formed when sulfur burned in jar full of Oxygen. **(1 mark)**

b) Is the product formed acidic or basic? What colour taken by moist blue litmus paper **(2 marks)**

c) State the product formed when magnesium burned in jar full of Oxygen. What colour taken by moist blue litmus paper **(2 marks)**

17. a)Define **Biodegradable waste substance (1 mark)**

b) Proper management of waste is important to the economy of Rwanda. Explain the statement basing on the following:

(i) Saving money used in acquiring farm inputs. **(2 marks)**

(ii) Availability of enough food and biogas for the population. **(2 marks)**

18. "**Milk is a mixture**".

a.) Which type of mixture is milk? **(1 mark)**

b.) State any 3 components of milk. **(3 marks)**

c.) Cream is separated from the milk by which of the following: **(1mark)**

i) Centrifugation

ii) Condensation

iii) Chromatography

iv) Filtration

19. a) Water is used for very various domestic purposes. State one natural source of water. **(1 mark)**

b) State any 2 laboratory apparatuses which can be used during treatment of dirty water to remove impurities and explain how you can use them during treatment of dirty water . **(4 marks)**

20. "Matter is neither created nor destroyed". Explain this law using the reaction between Sodium and chlorine to produce Sodium chloride. **(5 marks)**

S1 MARKING SCHEME

1. a)Applications of chemistry: **1 mark for each**

   Making drugs,

   Making plastics

   Water treatment

   Making cosmetics

   -Local drinks (Urwagwa, ikigage) **1 mark for each correct answer**

   -Ghee (Ikimuri)

   -Traditional medicine etc

2.

a. Boiling tube
b. Test tube
c. Funnel
d. Measuring cylinder
e. Dropper /pipette/spatula
f. Weighing balance

(1 mark each)

3.

a.

A. Freezing /Solidification

B. Melting/ Fusion

C. Deposition / Sublimation

D. Condensation

E. Evaporation

(0.5 mark each)

i) Heating ii) Cooling **(2 marks)**

b. Iodine, ammonium chloride, Carbon dioxide **(2 marks)**

4.

a) c **(1mark)**

b)Sodium, Hydrogen, Carbon and Oxygen. **(2 marks)**

c)$KHSO_4$ **(1 mark)**

d) potassium hydrogen sulfate **(1 mark)**

5.

a. 19 protons **(1 mark)**
b. Neutrons: 39-19= 20 **(2 marks)**
c. By losing. It has one electron on the last shell. **(2 marks)**

6.

a) X=8: 2.6 valence is 2: Draw using Bohr model **(1 mark)**

b) i) Y=19: E.C: **2.8.8.1(1 mark)**

ii) Y belongs **to group 1** as it has **1 electron** on the last shell. **(2 marks)**

iii) Y belongs **to period 4**as it has **4 shells**.**(2marks)**

c) Y_2X**(1 mark)**

7. Aluminium oxide +sulphuric acid → aluminium sulphate +water

(2 marks)

a) P: Sodium chloride

b) Q: Oxygen

c) R: Copper

(1 mark each)

8. one for the indicator 2 for the colours

Indicator	**Solution**	
	acid	**base**
Litmus paper	Red	blue

Methyl orange	Red/orange	yellow
phenolphthalein	Colorless	pink
Extract from hibiscus	Red/pink	Green
Extract from red cabbage	Red	Bluish green

9.

a. i) Hydrogen bromide ,
   ii) Magnesium hydroxide
   iii) Sodium chloride **(3 marks)**
b. HBr; NaCl; $Mg(OH)_2$ **(3 marks)**

10.

a) NaCl, $CaCl_2$

b) Na^+ and Cl^-

- c) food seasoning, acting as a natural preservative, enhancing the natural colors of foods, creating a brine for marinating foods….**(2 marks)**

11.

a. **A pure substance** is one that possesses identical components. **e.g: pure water (0.5+0.5 mark)**
   A **mixture** It is a composition of two or more substances. Examples are salt and water, maize and beans, salt solution and well stirred tea.
   (0.5+0.5 mark) Accept any correct answer.

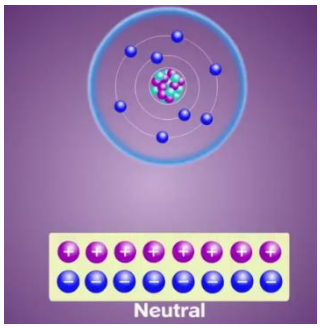
b.

- Chromatography **(1 mark)**
- Fractional distillation**(1 mark)**

c.

- Evaporation **(1 mark)**
- Decanting **(1 mark)**

12.



Nucleus(Protons& neutrons): **(1 mark)**

Electrons: **(1 mark)**

Neutrality (Equal number of protons and electrons): **(2 marks)**

13

a. $CaCO_3 \longrightarrow CaO + O_2$ **(3 marks for each correct reagent and products)**

b. Soluble salts $CuSO_4$ **(1mark)**

Insoluble salts $CaSO_4$ **(1mark)**

14.

a. Air pollution refers to the contamination of air by substances like dust, pollen, car emissions, chemicals and smoke from factories.

b. See 14.a. **(Consider any 2, 2marks)**

15

The atmospheric air **is polluted** since the **% of oxygen is reduced (from 21 to 18%),** % of **CO_2 increases (from 0.03 to 2%).** The remaining elements also have **high %(from1 to 2%).**

It seems that air in this zone **has too much dust, carbon dioxide and other impurities**. **(1 marks each)**

16

Sulphur when burns in air forms SO_2 **(1 mark)**

It burns in the presence of oxygen, producing Sulphur dioxide, which is acidic Red litmus paper remains red while Blue litmus paper turns red. **(2 marks)**

Magnesium oxide is formed. It reacts with water to produce magnesium hydroxide, a basic solution.

Blue litmus paper remains blue while red litmus paper turns blue. **(2 marks)**

17.

a. Biodegradable substances are those that degrade or break down naturally. **(1 mark)**

i). **Biodegradable wastes** may form **manures** used in farming as fertilizer. People can save on buying chemical fertilizers **(2 marks)**

ii). The **manure** produced will increase crop production, hence **enough food** for the population. We can also produce biogas from the compost. **(2 marks)**

18

Milk is not a pure substance. It is a **mixture**. **(1 mark)**

a. Homogeneous mixtures **(1 mark)**
b. It is composed by:

- Sugars, Minerals, Proteins, Vitamins, Fats, Water…

(Consider any 3, 3marks)

c. i) Centrifugation

19. The major sources of water include **(1 mark)**

- underground water
- Surface water
- Rainwater.

- **Filter funnel**: It can be used to filter water and to remove solid impurities.
- **Separating funnel**: is used to separate water from immiscible liquid.
- **Liebig Condenser and distillation flasks**: it can be used to separate pure water from any impurities

Consider any 2 materials (4 marks)

20

Na +Cl $\longrightarrow$ NaCl **(1 mark)**

Count the number of atoms on both sides. The number of atoms **of each specie** is same on left side and right side of the arrow. Only a **rearrangement** of atoms happens to produce a **new substance**. **(4 marks)**

CHEMISTRY THEORY

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2. Do not use periodic tables
3. Non-programmable calculators may be used
4. Answers should be written on blank papers provided
5. Use a blue or black pen only

SECTION A: Attempt all questions in this section (70 marks)

1. a) Chemistry has many applications in daily life. List any two (2) applications of chemistry. (**2 marks)**

   b) Chemistry had been applied in traditional Rwanda for purposes; Find any two (2) products which were obtained by chemical transformation in traditional Rwanda.(**2 marks)**

2. Choose among the following pieces of laboratory apparatus the most suitable for each of the following activities? **(4 marks**)

   (Weighing balance, spatula, Funnel, Measuring cylinder)

   (a) Pouring 50 cm^3 of acid from one container to another.

   (b) Measuring exactly 30 cm^3 of water

   (c) Removing substances from a reagent bottle

   (d) Weighing 100 grams of sodium chloride

3. a. Find any two substances which, at room temperature, are in: **(3 marks)**

      i) In solid state?

      ii) Liquid state?

      iii) Gaseous state?

   b. In what state are the particles:

      i) Furthest apart

      ii) Closest together **(2 marks)**

   c. Describe the differences between the particles in a solid and the particles in a liquid. **(2 marks)**

4. a) Choose the correct answer **(1 mark)**

Atoms always react because they want to:

(i) Be with other atoms.

(ii) Form molecules

(iii) Attain stable electronic configuration.

(iv) Gain electrons

b). Name the four elements contained in Sodium hydrogen carbonate./**2 marks**

c) Given the positive ion $K^+$and negative ion HSO_4^- , write the formula of the compound that would be formed if the two ions combined. (**1 mark)**

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5. An atom X (not its chemical symbol) has atomic number **19**.

(a) How many protons does it have in its nucleus? **(1 mark)**

(b) If its mass number is 39, calculate the number of neutrons in its nucleus **(show your work). (2 marks)**

(c) Does X become stable by gaining or losing electrons? Explain. **(2 marks)**

6. The elements of X and Y have the following atomic numbers, X=8, Y=19.

a) Write the electronic configuration of X=8. **(1 mark)**

b) (i) Write the electronic configuration of Y.**(1 mark)**

(ii) To which group does Y belong? Why **(2 marks)**

(iii) To which period does Y belong? Why **(2 marks)**

c) Write down the formula of a compound formed between Y and X. Use Y and X as symbols in the compound. **(1 mark)**

7. a) Translate the following chemical equation into word equation. **(2 marks)**

$Al_2O_3(s) + H_2SO_4(aq) \rightarrow Al_2(SO_4)_3(aq) + H_2O(l)$

b. Give the identities of P,Q and R in the following equations.

i) Sodium + chlorine → P **(1 mark)**

ii)Calcium + Q→ Calcium oxide **(1 mark)**

iii) R + Iodine →Copper iodide **(1 mark)**

8. Identify any three applications of bases in daily life. **(3 marks)**

9. The name of various chemicals with their respective pH values in aqueous solutions are shown below

SOLUTIONS	p H
Hydrogen bromide	2
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Magnesium hydroxide	10

a) Which of these substance is **(3 marks)**

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b) Write the chemical formula for each substance given in the table above **(3 marks)**

10. a) Give 2 examples of inorganic salts. **(2 marks)**

b) State the positively charged ion and negatively charged ion in sodium chloride **(2 marks)**

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ii. A mixture

b) State 2 methods that can be used to separate a homogeneous mixture **(2 marks)**

c) State the easiest method one could use to obtain the substance shown from the following mixtures: **(2 marks)**

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ii) Petrol from a mixture of water and petrol.

12. Atoms are said to be neutral. Use an atom of Oxygen atom (Z=8) as an example:

    a) Give different particles of an atom of oxygen.

    b) Explain the origin of neutrality of oxygen atom. **(4 marks)**

13. a) Write the chemical equation of thermal decomposition (decomposition by heat) of the following salt: **(3 marks)**

    -Calcium carbonate decomposes into Calcium oxide and carbon dioxide

    b) Classify the following among soluble salts and insoluble salts: $CaSO_4$, $CuSO_4$, **(2 marks)**

14. a) What do you understand by 'air pollution'? **(1 mark)**

    b) State any two air pollutants. **(2 marks)**

SECTION B: Attempt All 6 questions in this section (30 marks)

15. An analysis of atmospheric air in an industrial zone showed the following results

Elements	atmospheric air composition in industrial zone (%)	Normal atmospheric air composition (%)
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Compare the results found in the industrial zone and the result of normal atmospheric air composition.

Is the area (zone) polluted or not. WHY. **(5 marks)**

16. Different substances are lowered in a gas jar of oxygen.

a) State the product formed when sulfur burned in jar full of Oxygen. **(1 mark)**

b) Is the product formed acidic or basic? **(1 mark)**

c) Write the chemical equation of the reaction between the substance formed in **(b)** and water. **(1 mark)**

d) State the product formed when magnesium burned in jar full of Oxygen. **(1 mark)**

e) Write the chemical equation of the reaction between the substance formed in **(d)** and water. **(1 mark)**

17. a)Define **Biodegradable waste substance (1 mark)**

b) Proper management of waste is important to the economy of Rwanda. Explain the statement basing on the following:

(i) Saving money used in acquiring farm inputs. **(2 marks)**

(ii) Availability of enough food and biogas for the population. **(2 marks)**

18. "**Milk is a mixture**".

a.) Which type of mixture is milk? **(1 mark)**

b.) State any 3 components of milk. **(3 marks)**

c.) Cream is separated from the milk by which of the following: **(1mark)**

i) Centrifugation

ii) Condensation

iii) Chromatography

iv) Filtration

19. a) Water is used for very various domestic purposes. State one natural source of water. **(1 mark)**

b) Give two properties of pure water and two characteristics of clean water. **(4 marks)**

20. "Matter is neither created nor destroyed". Explain this law using the reaction between Sodium and chlorine to produce Sodium chloride. **(5 marks)**

S 1 marking scheme-blind

1. a)Applications of chemistry: **choose 2 answers**

   Making drugs,

   Making plastics

   Water treatment

   Making cosmetics

   -Local drinks (Urwagwa, ikigage) **choose 2 answers**

   -Ghee (Ikimuri)

   -Traditional medicine etc…

2.

a. Funnel
b. Measuring cylinder
c. Dropper /pipette/spatula
d. Weighing balance

   1 mark each)

3.

a. Table salt, Water, Oxygen **(Accept any other correct answer) (3 marks)**
b. i) Gas ii) Solid **(2 marks)**
c. Particles of a solid are **closely packed**. They are held in fixed positions by strong interparticle forces of attraction. They therefore vibrate but they do not move from one place to another. It is for this reason that solids have a fixed shape. **In a liquid, particles are free to move randomly but tend to stick together**. This is because they have moderate forces of attraction between them. They are hence less closely packed as compared to solid particles. **(2 marks)**

4**.**

a) c **(1mark)**

b)Sodium, Hydrogen, Carbon and Oxygen. **(2 marks)**

c)$KHSO_4$ **(1 mark)**

d) potassium hydrogen sulfate **(1 mark)**

5.

a. 19 protons **(1 mark)**
b. Neutrons: 39-19= 20 **(2 marks)**
c. By losing. It has one electron on the last shell. **(2 marks)**

6.

a) X=8: 2.6 valence is 2: **(1 mark)**

b) i) Y=19: E.C: **2.8.8.1(1 mark)**

ii) Y belongs **to group 1** as it has **1 electron** on the last shell. **(2 marks)**

iii) Y belongs **to period 4**as it has **4 shells**.**(2marks)**

c) Y_2X**(1 mark)**

7. Aluminium oxide +sulphuric acid → aluminium sulphate +water **(2 marks)**

a) P: Sodium chloride

b) Q: Oxygen

c) R: Copper

(1 mark each)

8. Some applications of bases: Choose 3 answers

1. Ammonia solution is used in the manufacture of fertilizers and detergents.
2. Sodium hydroxide is used in the manufacture of soaps and detergents.
3. Ammonium hydroxide is used to make cleaning agents such as oven cleaners.
4. Magnesium hydroxide is used in the treatment of indigestion.
5. Calcium hydroxide is used as garden lime to reduce soil acidity and in the manufacture of cement and toothpaste.

9.

a. i) Hydrogen bromide,
   ii) Magnesium hydroxide
   iii) Sodium chloride **(3 marks)**
b. HBr; NaCl; $Mg(OH)_2$ **(3 marks)**

10.

a) NaCl, $CaCl_2$**(2 marks)**

b) Na^+ and Cl^-**(2 marks)**

c) food seasoning, acting as a natural preservative, creating a brine for marinating foods….**(2 marks)**

11.

a. **A pure substance** is one that possesses identical components. **e.g: pure water (0.5+0.5 mark)**
   A **mixture:** It is a composition of two or more substances. Examples are salt and water, maize and beans, salt solution and well stirred tea.
   (0.5+0.5 mark) Accept any correct answer.

b.

- Chromatography **(1 mark)**
- Fractional distillation**(1 mark)**

c.

- Evaporation **(1 mark)**
- Decanting **(1 mark)**

12. Nucleus (Protons& neutrons): **(1 mark)**

Electrons: **(1 mark)**

Neutrality (Equal number of protons and electrons): **(2 marks)**

13

a. $CaCO_3$ $\longrightarrow$ $CaO + O_2$ **(3 marks for each correct reagent and products)**

b. Soluble salts $CuSO_4$ **(1mark)**

Insoluble salts $CaSO_4$ **(1mark)**

14.

a. Air pollution refers to the contamination of air by substances like dust, pollen, car emissions, chemicals and smoke from factories.

b. See 14.a. **(Consider any 2, 2marks)**

15

The atmospheric air **is polluted** since the **% of oxygen is reduced (from 21 to 18%),** % of **CO_2 increases (from 0.03 to 2%).** The remaining elements also have **high %(from1 to 2%).**

It seems that air in this zone **has too much dust, carbon dioxide and other impurities**. **(1 marks each)**

16

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i). **Biodegradable wastes** may form **manures** used in farming as fertilizer. People can save on buying chemical fertilizers **(2 marks)**

ii).The **manure** produced will increase crop production, hence **enough food** for the population. We can also produce biogas from the compost. **(2 marks)**

18

a. Homogeneous mixture **(1 mark)**
b. It is composed by:

- Sugars, Minerals, Proteins, Vitamins, Fats, Water…

(Consider any 3, 3marks)

c. i) Centrifugation **(1 mark)**

19. The major sources of water include **(1 mark)**

- underground water
- Surface water
- Rainwater.

- **Filter funnel**: It can be used to filter water and to remove solid impurities.
- **Separating funnel**: is used to separate water from immiscible liquid.
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Consider any 2 materials (4 marks)

20

Na +Cl $\longrightarrow$ NaCl **(1 mark)**

Count the number of atoms on both sides. The number of atoms **of each specie** is same on left side and right side of the arrow. Only a **rearrangement** of atoms happens to produce a **new substance**. **(4 marks)**

ALTERNATIVE TO PRACTICAL EXAM

Date: ... 24 / 06... /2022
Period:.. 8H30-10H00...

NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

END OF TERM III EXAMINATIONS

GRADE / LEVEL: **S1**
OPTION / Ordinary **level**

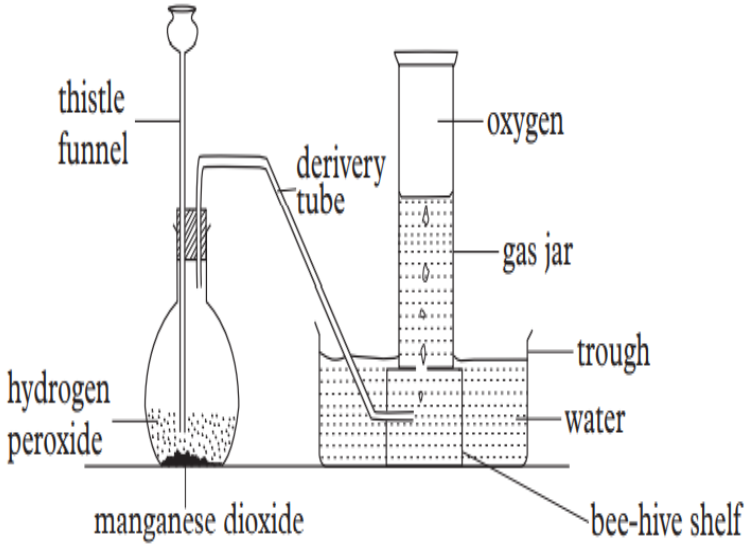
DURATION: **1 HOUR 30 minute**

MARKS: **..... /15.....**

INSTRUCTIONS

1. Please read carefully before you start answering.
2. This paper has two questions. **(15 marks)**
3. Answer the questions in your answer booklet.

1. Here is a diagram for the preparation of oxygen from hydrogen peroxide.



a. State the physical properties considered when collecting a gas. **(2 marks)**

b. Explain the test for Oxygen. **(1mark)**

c. Explain why mountain climbers and deep-sea divers need to have cylinders of oxygen. **(2 marks)**

2.

Mixtures can be separated in various ways depending on the physical properties of their components. A student is supplied with two different mixtures. The first is a mixture of two solids, sodium chloride and sand. The second is a mixture of two liquids, ethanol and butanol. For each mixture, describe a method to obtain a pure sample of each substance in the mixture. In your description you should include the names of any techniques and apparatus used.

(a) Solid sodium chloride and sand **(5marks)**
(b) Ethanol and butanol **(5marks)**

S1 Marking scheme-Alternative to Practical Chemistry

1.

a. Density
   Solubility **(2 marks)**

b. Oxygen relights a glowing splint. **(1 mark)**

c. In upper atmosphere and in deep of the sea there is a shortage of oxygen. **(2 marks)**

2(a)
M1 add water (to mixture) to dissolve sodium chloride **(1mark)**
M2 heat / stir **(1mark)**
M3 filter (with funnel / filter paper to separate sand from solution) **(1mark)**
M4 wash sand / residue **(1mark)**
M5 evaporate solution / filtrate or crystallise solution / filtrate **(1mark)**

2(b) M1 heat / boil mixture **(1mark)**
M2 distil / (fractional) distillation / fractionation **(1mark)**
M3 mention of indirect heating / water bath / heating mantle **(1mark)**
M4 lower b.pt. alcohol / more volatile / ethanol boils off / higher b.pt. alcohol / butanol remains in flask **(1mark)**
M5 condense (vapour) / (use of) a condenser **(1mark)**