

**HARRISON UWATA GIRLS SECONDARY SCHOOL
&
PERAMIHO GIRLS' SECONDARY SCHOOL**

**FORM TWO JOINT EXAMINATION
CHEMISTRY**

**SERIES 2
MARKING GUIDE**

032

A student required to answer all questions from all sections.

SECTION A (15 Marks)

1.

i	ii	iii	iv	v	vi	vii	viii	ix	x
D	B	D	B	E	E	E	D	D	A

(@ 01 = 10 marks)

2.

LIST A	i	ii	iii	iv	v
LIST B	E	G	C	B	D

(@ 01 = 05 marks)

SECTION B (70 Marks)

3. Five (5) importance of science laboratories to secondary school students are:

- Science laboratories provide basic training.

The training develops student's skills necessary for more advanced study or research. This is because experiments involve manipulation of materials of science.

- Enhance mastery of the subject matter.

Laboratory experiences may facilitate student understanding of specific scientific facts and concepts through performing experiments which finally prove or disprove the hypothesis.

- Experimenting in a science laboratory helps the student to develop better memory power.

There is always an active involvement of both hands and mind while experimenting (performing experiments).

- Developing practical skills.

In laboratory experiences, students may learn to use the tools and conventions of science. For example, they may develop skills in using scientific equipment correctly and safely, making observations, taking measurements, and carrying out well-defined scientific procedures.

- Understanding of the nature of science.

Laboratory experiences may help students to understand the values and assumptions inherent in the development and interpretation of scientific knowledge, such as the idea that science is a human endeavor that seeks to understand the material world and that scientific theories, models, and explanations change over time on the basis of new evidence.

- Cultivating interest in science and science subjects.

As a result of laboratory experiences that make science "come alive," students may become interested in learning more about science and see it as relevant to everyday life.

- Developing teamwork abilities: Laboratory experiences may also promote a student's ability to collaborate effectively with others in carrying out complex tasks, to share the work of the task, to assume different roles at different times, and to contribute and respond to ideas.

- Improving vocabulary:

The terminology used in science classes are different from what one learns in normal classrooms. Through science experiments, kids learn about new concepts and words which expand their vocabulary

- **Developing scientific reasoning:** Laboratory experiences may promote a student's ability to identify questions and concepts that guide scientific proof. (@02 = 10 marks)

4. (a) Three (3) precautions that should be taken when giving First aid to a victim are:

- Assess the situation quickly and calmly.
- Safety: check whether you or the casualty (victim) is in any danger.
- Protect yourself and them from any danger.
- Prevent infection between you and the victim.
- Comfort and reassure the victim that she/he will recover soon.
- Use clean bandages and dressings.
- Wash off any body fluids immediately.
- Clean wounds and try not to get dirt into them.
- Do not cough or sneeze onto the casualty's wounds.
- Wear gloves that are not thin, worn or torn. Wear two pairs of gloves if possible.
- Wear personal protective equipment whenever necessary. Wear gloves, nose mask, face shield, safety boots, and protective coat whenever necessary. (@01 = 03 marks)

(b) (i)

Warning sign		
Name	Corrosive	Oxidant

(01 mark)

(01 mark)

(ii) Concentrated nitric acid is stored in dark brown bottles away from direct sunlight in order to prevent it from being decomposed into nitrogen dioxide gas, oxygen gas and water.



(01 mark)

(iii) Two (2) precautions that must be taken when using concentrated nitric acid are:

- Use it in ventilated areas.
- Wear protective gears/ equipment like hand gloves, safety boots, face shield, safety goggles and lab coat/apron.
- Avoid contact with metals like copper, aluminium, iron as it will corrode these metals.
- When diluting the acid, never add water into the acid because doing so will cause the highly exothermic reaction. This reaction may cause the acid to splash out and cause burns.
- Keep the acid away from ignition, combustible materials, incompatible materials, direct sunlight and high temperature. (@01 = 02 marks)

(c) Two (2) reasons for why a sand bath and a magnetic heater are not the preferred heat sources in the laboratory despite of not producing soot are:

- Both sand bath and magnetic heater (magnetic hot plate) cannot produce any flame. Luminous flame is essential for lighting while a non-luminous flame may be needed for flame test.
- Both sand bath and magnetic heater (magnetic hot plate) are risky and dangerous when using them since they cannot produce a visible flame and they remain hot for a time even if turned off. Hence may cause burns and fires when kept closer to combustibles.
- They require some skills on operating them. (@01 = 02 marks)

5. (a) Four (4) reasons for why water and sodium chloride are compounds are:

- The constituent elements of these substances (sodium chloride and water) cannot be separated by physical methods, but can be separated by chemical methods.
 - Compounds have always definite/fixed compositions by mass of the elements. The proportions are fixed. There is one oxygen and two hydrogen in water (H₂O). There is one sodium and one chlorine in sodium chloride (NaCl).
 - Chemical changes are involved when forming these substances (sodium chloride and water).
 - Components of these substances (sodium chloride and water) cannot be seen separately.
 - The properties of these substances (sodium chloride and water) are very different from those of the individual elements.
- (@01 = 04 marks)

(b) A burning candle shows both physical change and chemical change as follows:

- Wax melts to form vapour. Melting and vaporization are **physical changes**. (01 mark)
- The wax vapours then burn at the wick to leave behind soot and water vapours while emitting heat and light. The burning of wax vapours is a **chemical change**. (01 mark)

(c)

Bottle	Mixture	Method of separation
P	Ethanol and water	Fractional distillation
Q	Iodine and sand	Sublimation
R	Cooking oil and water	Layer separation
S	Water and salt	Evaporation

(@01 = 04 marks)

6. (a) - Heating the pink substance to form a blue substance, it is a chemical change since new substance was formed.

- But the whole process involve physical change because the substance remained pink and no new substance was formed. (03 marks)

(b) (i) A: Class B

B: Class C

C: Class A

(@01 = 03 marks)

(ii) It is dangerous because water extinguisher will spread the flame. Water is dense than these burning materials (flammable liquid and gas), hence these burning materials will float over water leading to spreading the flame. (02 marks)

(iii) This is because burning material can re-ignite. (02 marks)

7. (a) The suitable catalyst is manganese(IV) oxide. (02 marks)

(b) - They have variable oxidation state so that they form unstable intermediate products with reactants.

- The catalyst has large surface area; hence it absorbs reactants and force them to react. (02 marks)

(c) Hydrogen peroxide $\xrightarrow{\text{Manganese(IV) oxide}}$ Water + Oxygen gas (02 marks)

(d) Four (4) uses of the gaseous product (oxygen gas) are:

1. Living organisms

- ☐ Daily breathing and respiration ☐ Germinating seeds ☐ Divers in deep water
☐ Mountain climbers ☐ Patients and premature babies

2. Transport

- ☐ In submarines ☐ In space-craft ☐ In rocket fuel

3. Environment

- ☐ Ozone layer replenishment ☐ Sewage treatment ☐ Burning of wastes

4. Industrial chemical processes

- ☐ Manufacturing of synthetic fiber ☐ Welding ☐ Manufacturing of steel
☐ Incineration of substances ☐ Metal cutting ☐ Glass making
☐ Pulp and paper making ☐ Manufacturing of chemicals

(@01 = 04 marks)

8. **(a)** Sodium metal is not used for preparation of hydrogen gas in the laboratory by the action of dilute acids because reaction of dilute acids with sodium is explosive/highly exothermic in nature, so we could not control the reaction. **(03 marks)**

(b) Precautions when using each method of purifying water domestically are:

Method of water Purification	Precaution
Boiling	■ Water should be boiled enough so as to kill all diseases causing organisms. ■ Boiled water must be cooled and filtered with a clean cloth before using it.
Use of purifiers	■ Amount of chemical used in purification must depend on the amount of water to be treated. This is for ensuring the dose is not less or overdosed. ■ Shaking or stirring of water is necessary to ensure proper treating of water.
Use of commercial filters	■ Activated charcoal is associated with health problems like nausea and vomiting. ■ The layers should be replaced regularly for effective purification of water, unless the purification will be ineffective.

(@01 = 03 marks)

(c) Four (4) importance of water treatment and purification are:

- Water that has not been treated may contain harmful bacteria and other microorganisms that can cause different diseases such as diarrhoea, typhoid, cholera, and other illnesses.
- Untreated water will usually lead to usage of large amounts of detergents such as soaps for cleaning.
- Treated water is the best for use in laboratories and medical facilities to ensure accurate results from experiments and effective medical treatments.
- Treated water is suitable for use in factories to ensure the manufactured products are safe for consumption.
- Treated water is more efficient to use for cleaning in industries and in domestic settings.
- Treated water reduces corrosion of different containers and instruments.

(@01 = 04 marks)

9. (a) Four (4) advantages of Moseley periodic table over Mendeleev's periodic table are given below:

- In Moseley's periodic table, elements are arranged in order of increasing atomic numbers, hence elements with different properties are placed in different groups and periods

While

In Mendeleev's periodic table, elements were arranged in order of increasing atomic weights, hence elements with different properties were placed together.

- In Moseley's periodic table, the position of hydrogen is known. Hydrogen is placed on top of group one.

While

In Mendeleev's periodic table, the position of hydrogen was uncertain. Hydrogen was placed in group one and group seven.

- In Moseley's periodic table, the anomalies of placing elements with higher atomic masses before elements with lower atomic masses are resolved.

While

In Mendeleev's periodic table, Elements with higher atomic masses were placed before the elements with lower atomic masses. For example, argon (atomic mass 39.9) was placed before potassium (atomic mass 39.1).

- In Moseley's periodic table, isotopes are treated as atoms of the same element. Isotopes of the same element are placed together because are from the same element.

While

In Mendeleev's periodic table, isotopes were treated as different elements. Isotopes of the same elements were placed differently.

- In Moseley's periodic table, rows of inner transition elements are included.

While

In Mendeleev's periodic table, rows of inner transition elements were not included.

- There are no gaps in the Moseley's periodic table because atomic numbers of known elements go from 1 to over 115 with no missing numbers.

While

In Mendeleev's periodic table, there were gaps for unknown elements.

(@01 = 04 marks)

(b) (i) L

(ii) I

(iii) M

(iv) H

(@00 $\frac{1}{2}$ = 02 marks)

(c) The chemical formula of the sulphate of aluminium is $\text{Al}_2(\text{SO}_4)_3$

(01 mark)

To determine the oxidation state of sulphur from $\text{Al}_2(\text{SO}_4)_3$

$$3\text{S} + (+3 \times 2) + (-2 \times 12) = 0$$

$$3\text{S} + (+6) + (-24) = 0$$

$$3\text{S} + 6 - 24 = 0$$

$$3\text{S} - 18 = 0$$

$$3\text{S} = +18$$

$$\text{S} = +6$$

Therefore, the oxidation state of sulphur in sulphate of aluminium is +6

(03 marks)

SECTION C (15 Marks)

10. (a) Ionization energy decrease from Be to Mg due to increase in the atomic size caused by increase in the number of shells. Hence Mg has low ionization energy than Be due to its large atomic size. **(04 marks)**
- (b) Electronegativity increases from Na to Cl due to increase in the effective nuclear charge caused by increase in the number of protons across the period. **(04 marks)**
- (c) Electronic configuration of Li and Na are respectively 2:1 and 2:8:1. These elements have similar properties because they have same number of electrons in their outermost shells. Elements with same number of electrons in their outermost shells occur in same group. **(02 marks)**
- (d) - The bond between hydrogen and fluorine is ionic (electrovalent) bond. **(01 mark)**
- The bond between hydrogen and chlorine is covalent bond. **(01 mark)**
- (e) Three (3) difference between the two types of bond in (d) above are:

The bond between hydrogen and fluorine (Ionic/ electrovalent bond)	The bond between hydrogen and chlorine (Covalent bond)
■ Formed between two elements with large difference in electronegativity.	■ Formed between two elements with very small electronegativity difference.
■ It is formed by cation (H^+) and anion (F^-).	■ It is formed by neutral atoms (H and Cl).
■ It is formed by transferring of electrons from hydrogen to fluorine.	■ It is formed by sharing of electrons between hydrogen and chlorine.
■ It is a stronger bond.	■ It is a weak bond.
■ It is non-directional. This means the strength of interaction between the ions depends upon the distance but not on the direction.	■ It is directional. This means the strength of interaction between two elements depends upon the direction but not on the distance.

(@01 = 03 marks)

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