Uganda Martyrs University

FACULTY OF EDUCATION
BACHELOR OF EDUCATION (PRIMARY) YEAR TWO
SEMESTER ONE EXAMINATIONS, 2022/23
PHYSICAL SCIENCE EDUCATION

PAPER ONE: PHYSICAL AND CHEMICAL PROPERTIES OF WATER AND HYDROGEN

DATE: Wed 11/01/2023 **3hrs** **Time: 9:30 am-12:30 pm**

Instructions:

- **Do not write anything on this question paper.**
- **Attempt FOUR questions.**
- **Begin each selected question on a new page in the answer booklet.**
- **Follow instructions on this question paper and answer booklet carefully.**
- **Each question carries a total of 25 marks.**
- **Write essays clearly, using illustrations where applicable,**
- **Indicate the order of questions answered on the front page of the answer booklet**

1. a. Using examples explain the terms: i. Hydration ii. Hydrolysis **10mks**
b. Using balanced equations where possible, explain the following observations
i. A solution of NaCl reacts neutral to litmus
ii. A solution of Sodium Ethanoate reacts alkaline to litmus
iii A solution of Ammonium Chloride reacts acidic to litmus

15mks

2. The intermolecular forces of water influence its physical and chemical Properties. Clearly explain the following observations which relate to forces between the water molecules.

a. Water;
i. Behaves as an acid and as a base but reacts neutral to litmus
ii is a liquid at room temperature
iii. Boils at 100^0C and 1 atmospheric Pressure
iv. Supports moving/floating vessels such as ships and boats
v. is considered to be a universal solvent **15mks**
b. i. Water molecules make glass surfaces wet
ii. Water molecules turn white anhydrous Copper II Sulphate blue

10mks

3. Hydrogen has no specific location in the Periodic Table. Some of the reasons for this include the fact that it has characteristic features of group one elements and those for group seven elements.

a. With equations where applicable state five (5) ways in which hydrogen resembles group one elements and five (5) ways in which it resembles the group seven (7) elements in the Periodic Table. **15mks**

b. As a year two Student of Physical Science indicate how you would best position hydrogen on the Periodic Table. **5mks**

c. Give reasons for placing hydrogen as you have done in (b) above. **5mks**

4. Water which produces lather with soap readily is said to be soft while the water that does not produce lather with soap readily is considered to be hard. Hard water is further categorized into temporary and permanent hardness.

a. State three examples of water sources that produce soft water and three water sources that produce hard water **5mks**

b. Explain the causes of hardness in the water systemsand give a reasoned argument why hard water wastes soap. **10mks**

c. Describe five major points of difference between temporary and permanent hardness in the water systems. **10mks**

5. The process of removing hardness from water is called water softening. There are various ways in which hard water can be softened.

Discuss, a.

i. Two ways of removing temporary hardness

ii. Three ways of removing permanent hardness **10mks**

b. Explain the water purification process in order to make it safe and *good* for use **15mks**

6. a. Write balanced reaction equations where possible, for each of the following pairs of substances.

i. $SO_2\,(g) + H_2O\,(l)$ ⟶

ii. $H_2O\,(l) + H_2O\,(l)$ ⟶

iii. $H_2O\,(l) + Na_2CO_3\,(s)$ ⟶

iv. $Na\,(s) + H_2O\,(l)$ ⟶

v. $Ca(s) + H_2O\,(l)$ ⟶ **10mks**

b. Clearly explain what happens when **water** is added to the following substances, and with the help of balanced equations where applicable, illustrate the reactions that take place in each case.

i. H2SO4 (l)

ii. $NaCl\ (s)$

iii. $NaOH\ (s)$

iv. $CH_3COOH\ (l)$

v. $CuCO_3\ (s)$ **15mks**

7. It is well known that water is: an oxide of hydrogen, an important component of animal and vegetable matter, constituting about 65% of the human body and a principal constituent of the earth's surface and therefore efforts to conserve it are critical because its misuse can lead to loss of plant and animal lives.

i. Describe an experiment which illustrates that water is an oxide of hydrogen **7mks**

ii. What should you do if your neighbors, the local church, school, golf course, etc., are violating water conservation policies? Or spoiling it by mostly adding pollutants?

3mks

b. How does the amount of available water impact our environments and how do humans conserve or waste water in our daily lives? **15mks**

8. a. Write brief notes on Hydrogen **10mks**

b. Write balanced equations for the reactions of hydrogen and

i. Copper II Oxide (red hot)

ii. Oxygen gas

iii. Lithium metal

iv. Magnesium metal

v. Sodium metal **15mks**

END