**EMERALD ROYAL INTERNATIONAL SCHOOL, MPAPE ABUJA**

**LESSON PLAN AND NOTE FOR WEEK 7 ENDING FRIDAY: 24th FEBRUARY, 2023**

**TERM:** 1st

**WEEK:** 7th

**DATE** : 20th – 24th February 2023

**SUBJECT:** Physics

**CLASS :** SS 1

**TOPIC:**  **PARTICULATE NATURE OF MATTER**

**SUB - TOPIC:** 1. Crystal structure of matter

1. Non-crystalline or Amorphous Substances
2. States of matter

**PERIOD:** 3rd

**TIME:** 9: 30 - 10:10am

**DURATION:** 40 minutes

**AVERAGE AGE:** 16 years

**SEX:** Mixed

**SPECIFIC OBJECTIVES:** By the end of the lesson, students should:

1. Explain the structure of matter
2. Explain the atomic structure
3. Define molecules

**RATIONALE:** To enables students understand the concept matter

**PREVIOUS KNOWLEDGE:** Students have being taught matter

**INSTRUCTIONAL RESOURCES:** Charts showing fields, bar magnets and properties of fields

**REFERENCE:** Senior Secondary School Physics by P.N. Okeke et al, New School Physics for Senior Secondary Schools by Anyakoha, M.W, Comprehensive Certificate Physics by Olumuyiwa Awe and Okunola, O.O, Science Teachers Association of Nigeria Physics for Senior Secondary School, Book 1. New Edition and Melrose Physics for Senior Secondary School, Book 1 by Akano, O and Onanuga, O.O.

**LESSON DEVELOPMENT**

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| --- | --- | --- | --- | --- |
| **STEPS** | **TEACHER’S ACTIVITIES** | **STUDENTS’ACTIVITIES** | **LEARNING POINTS** |  |
| **INTRODUCTION** | The teacher introduces the lesson by asking the following questions::   1. What are cystals? 2. State the types of cystal matters 3. What are the three states of matter? | The students respond based on their previous knowledge | To arouse the students interest toward the lesion. |  |
| **STEP 1** | The teacher explains Crystal structure of matter | The students pay attention. | To keep them focus. |  |
| **STEP 2** | The teacher explains Non-crystalline or Amorphous Substances | The students explain the difference between Non-crystalline or Amorphous Substances | To encourage critical thinking |  |
| **STEP 3** | The teacher defines and explains the States of matter | The students participate in the class discussion | To encourage students retentiveness |  |
| **BOARD SUMMARY** | **Sub topic 1. Crystal structure of matter**  A crystal is a solid matter that has definite melting point and definite characteristic shape irrespective of the size. In any crystal, the atoms, molecules or irons are arranged in definite repetitive pattern or lattice. Substances which have the same crystalline shape are said to be isomorphous. This implies that crystalline substances exist in different shapes. For example, sodium chloride crystals have cubical shape. Other crystals shapes are; prismatic and octahedral shapes. See diagrams below.   1. Cubic crystal (b) Prismatic crystal (c) Octahedral   E. g Sodium Chloride e.g Copper II e.g alum  Tetraoxosulphate(VI)  The basic unit of a crystal is called ***unit cell***. If these unit cells are packed up and down, side by side, in all directions, a cubic lattice will emerged. The atoms or molecules or ions are placed at the corners of the unit cells stacked side by side, up and down like building blocks. This is the structure of sodium chloride (NaCl). In sodium chloride crystal structure, the atoms of (Na) and (Cl) are arranged such that the atoms take alternate positions in the cube. Each atom within the crystal has six immediate neighbours. The chloride ions (Cl-) are larger than the sodium ions (Na+). Since their charges are opposite, they are held together by strong electrostatic forces.  CL-  Na+  **Sodium chloride (NaCl) cubic crystals**  Other types of unit cells are; face-centred cubic (FCC) and the body centred cubic (BCC) crystals.   1. **Face-centred cubic crystals:**   These crystals have identical atoms at each of the corners and different atom or ion at the centre of each of the faces as shown in Zinc Sulphide (ZnS) unit cell below.  **Face-Centred Cubic crystals**  **2. Body-Centred cubic crystals**  Crystals that fall into this group are: Chromium, ion and platinum salts. In these crystals, the unit cell has identical atoms or ions at each corner and one different atom or ion at the centre of the unit cell as shown in the diagram below.  **Body-Centred Cubic Crystals**  **Subtopic 2: Non-crystalline or Amorphous Substances**  Non-crystalline or amorphous substances do not have definite shape because their atoms are not regularly arranged like that of crystalline substances. These substances behave more like liquids than solids. Examples of non-crystalline substances include: glass, plastics, tar, e.t.c. the molecules of these substances are long-chain and are inter twined in the liquid state as shown below.  **Chain-like molecules of amorphous** substances  **Note:** Crystalline substances have high melting points because much heat is required to break the strong intermolecular forces binding the molecules together.  **Differences between amorphous and crystalline substances**   |  |  |  | | --- | --- | --- | | **s/n** | **Crystalline substances** | **Amorphous substances** | | 1 | They have definite shape | No definite shape | | 2 | They have definite and high melting points | They have no definite melting point | | 3 | They are usually soluble | They are not usually soluble | | 4 | They are either hydrated or anhydrous | All are anhydrous | | 5 | Crystallization takes place when melted | Crystallization never takes place when melted |   **Sub topic 3: State of matter**  Matter exists in three states, these are; Solid state, liquid state and gaseous state. In the solid state, the molecules are closely packed and held together by strong intermolecular forces. The molecules do not move because of these strong intermolecular forces. They can only vibrate about their mean positions. This accounts for why solids have definite shape and do not move easily.  In the liquid state, the intermolecular distances are greater and the molecules are also held together by forces which are not as strong as those holding the molecules of solids. For this reason, the molecules have some degree of freedom to move. This is the reason why liquids move and change shape easily.  In gaseous substances, intermolecular distances are the farthest and the intermolecular forces between the molecules are so weak that the molecules move freely. The kinetic energies of these molecules are greater than that of solids and liquids. That is why gases move fast and randomly. The table below gives the characteristics of the three states of matter.   |  |  |  | | --- | --- | --- | | Solids | Liquids | Gases | | Have definite shape | Have no definite shape. They take the shape of their container. | Have no definite shape | | Have fixed size and volume | Have fixed size and volume | Have no fixed size and volume but spread easily and occupy the volume of their container | | They don’t move easily | They can move easily | They move faster than liquids | | The molecules are closely packed and held together by strong intermolecular forces | Intermolecular distances are greater than that of solids but intermolecular forces are weaker than that of solids | Intermolecular distances are the farthest and intermolecular forces are weak and negligible | | They do not mix with other solids | They may mix or not mix with other liquids | Mix easily with other gases | | They are compressible | They are incompressible | They are compressible | | The students copy notes into their exercise book | For future reference. |  |
| **Evaluation** | The teacher evaluates the students with the following questions   1. Explain the structure of matter 2. Explain the atomic structure 3. Define molecules | The students attempt the questions. | To ascertain their level of understanding. |  |
| **Conclusion** | The teacher concludes the lesson by making corrections where necessary and go through their notes. | The students copy the note on the board. | For future use. |  |
| **Assignment** | The teacher evaluates the students as follows:   1. What is a crystal? 2. What is meant by crystal lattice? 3. Differentiate between body-centred cubic crystals and face-centred cubic crystals | The students copy assignment solve at home and submit for marking endorsement. | To encourage further studying at home. |  |



14/3/2023

Principal Head Instructor