**EMERALD ROYAL INTERNATIONAL SCHOOL, MPAPE ABUJA**

**LESSON PLAN AND NOTE FOR WEEK 4 ENDING FRIDAY, 2ND**

**FEBRUARY 2024**

**TERM: SECOND TERM**

**WEEK: WEEK 4**

**DATE : 29TH JANUARY - 2ND FEBRUARY 2024**

**SUBJECT: CHEMISTRY**

**TOPIC: SYMBOLS, FORMULA AND EQUATION.**

**SUB - TOPIC: 1. chemical symbols and their valences.**

1. **Empirical and molecular formula.**
2. **Law of chemical combination.**

**PERIOD : 5th**

**TIME : 11:10 -11:50**

**DURATION : 40 minutes**

**CLASS : SS1**

**NUMBER IN CLASS : 7**

**AVERAGE AGE : 14 years**

**SEX: mixed**

**LEARNING OBJECTIVES:** by the end of the lesson,the students should be able to;

1. Write chemical symbols..
2. Solve the empirical and molecular formula.
3. State the law of chemical combination.

**RATIONALE: T**he students should understand the law of chemical combination.

**PREVIOUS KNOWLEDGE:** The students have been taught state of matter.

**INSTRUCTIONAL MATERIALS:** Chart showing the empirical and molecular formula of compound.

**Reference Material:** New school chemistry for senior secondary schools by Osei- Yaw Ababio.

**LESSON DEVELOPMENT**

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| **STAGES** | **TEACHER’S ACTIVITIES** | **STUDENT’S ACTIVITIES** | **LEARNING POINT** |
| **INTRODUCTION** | The teacher introduces the lesson by reviewing the previous lesson. | The students pay attention. | To arouse the students interest. |
| **PRESENTATION**  **STEP 1** | The teacher writes the valences of the first 20 elements. | The students pay attention. | To keep them focus. |
| **STEP 2** | The teacher asks the students to write the chemical symbols of the first 20 elements and their valences. | The students write the symbols of the first 20 elements. | To encourage critical thinking |
| **STEP 3** | The teacher states the empirical and molecular formula of some compounds. | The students pay attention. | To keep them focus. |
| **BOARD SUMMARY** | **EMPIRICAL AND MOLECULAR FORMUL**  The [empirical formula](mhtml:file://C:/Users/PERPETUAL/AppData/Local/Microsoft/Windows/Temporary Internet Files/Content.IE5/Z6KQH8D8/Calculate_Empirical_and_Molecular_Formulas[1].mhtml!https://www.thoughtco.com/definition-of-empirical-formula-605084) of a chemical compound is a representation of the simplest whole number ratio between the elements comprising the compound. The [molecular formula](mhtml:file://C:/Users/PERPETUAL/AppData/Local/Microsoft/Windows/Temporary Internet Files/Content.IE5/Z6KQH8D8/Calculate_Empirical_and_Molecular_Formulas[1].mhtml!https://www.thoughtco.com/molecular-formula-definition-606378) is the representation of the actual whole number ratio between the elements of the compound. This step-by-step tutorial shows how to calculate the empirical and molecular formulas for a compound.  **Empirical and Molecular Problem**  A [molecule](mhtml:file://C:/Users/PERPETUAL/AppData/Local/Microsoft/Windows/Temporary Internet Files/Content.IE5/Z6KQH8D8/Calculate_Empirical_and_Molecular_Formulas[1].mhtml!https://www.thoughtco.com/what-is-a-molecule-definition-examples-608506) with [a molecular weight](mhtml:file://C:/Users/PERPETUAL/AppData/Local/Microsoft/Windows/Temporary Internet Files/Content.IE5/Z6KQH8D8/Calculate_Empirical_and_Molecular_Formulas[1].mhtml!https://www.thoughtco.com/definition-of-molecular-weight-605369) of 180.18 g/mol is analyzed and found to contain 40.00% carbon, 6.72% hydrogen and 53.28% oxygen.  **How to Find the Solution**  Finding the empirical and molecular formula is basically the reverse process used to [calculate mass percent](mhtml:file://C:/Users/PERPETUAL/AppData/Local/Microsoft/Windows/Temporary Internet Files/Content.IE5/Z6KQH8D8/Calculate_Empirical_and_Molecular_Formulas[1].mhtml!https://www.thoughtco.com/how-to-calculate-mass-percent-609502) or [mass percentage](mhtml:file://C:/Users/PERPETUAL/AppData/Local/Microsoft/Windows/Temporary Internet Files/Content.IE5/Z6KQH8D8/Calculate_Empirical_and_Molecular_Formulas[1].mhtml!https://www.thoughtco.com/definition-of-mass-percentage-and-examples-605878).  **Step 1: Find the number of moles of each element in a sample of the molecule.** Our molecule contains 40.00% carbon, 6.72% hydrogen and 53.28% oxygen. This means a 100-gram sample contains:  40.00 grams of carbon (40.00% of 100 grams) 6.72 grams of hydrogen (6.72% of 100 grams) 53.28 grams of oxygen (53.28% of 100 grams)  Note: 100 grams is used for a sample size just to make the math easier. Any sample size could be used, the ratios between the elements will remain the same.  Using these numbers, we can find the number of moles of each element in the 100-gram sample. Divide the number of grams of each element in the sample by the atomic weight of the element to find the number of moles.  moles C = 40.00 g x 1 mol C/12.01 g/mol C = 3.33 moles C  moles H = 6.72 g x 1 mol H/1.01 g/mol H = 6.65 moles H  moles O = 53.28 g x 1 mol O/16.00 g/mol O = 3.33 moles O  **Step 2: Find the ratios between the number of moles of each element.**  Select the element with the largest number of moles in the sample. In this case, the 6.65 moles of hydrogen is the largest. Divide the number of moles of each element by the largest number.  Simplest mole ratio between C and H: 3.33 mol C/6.65 mol H = 1 mol C/2 mol H The ratio is 1 mole C for every 2 moles H  The simplest ratio between O and H: 3.33 moles O/6.65 moles H = 1 mol O/2 mol H The ratio between O and H is 1 mole O for every 2 moles of H  **Step 3: Find the empirical formula.**  We have all the information we need to write the [empirical formula](mhtml:file://C:/Users/PERPETUAL/AppData/Local/Microsoft/Windows/Temporary Internet Files/Content.IE5/Z6KQH8D8/Calculate_Empirical_and_Molecular_Formulas[1].mhtml!https://www.thoughtco.com/empirical-formula-practice-test-questions-604118). For every two moles of hydrogen, there is one mole of carbon and one mole of oxygen.  The empirical formula is CH2O.  **Limitations of the Molecular and Empirical Formulas**  Both types of chemical formulas yield useful information. The empirical formula tells us the ratio between atoms of the elements, which can indicate the type of molecule (a carbohydrate, in the example). The molecular formula lists the numbers of each type of element and can be used in writing and [balancing chemical equations](mhtml:file://C:/Users/PERPETUAL/AppData/Local/Microsoft/Windows/Temporary Internet Files/Content.IE5/Z6KQH8D8/Calculate_Empirical_and_Molecular_Formulas[1].mhtml!https://www.thoughtco.com/definition-of-molecular-equation-605366). However, neither formula indicates the arrangement of atoms in a molecule. For example, the molecule in this example, C6H12O6, could be glucose, fructose, galactose, or another simple sugar. More information than the formulas is needed to identify the name and structure of the molecule.  **Empirical and Molecular Formula Key Takeaways**   * The empirical formula gives the smallest whole number ratio between elements in a compound. * The molecular formula gives the actual whole number ratio between elements in a compound. * For some molecules, the empirical and molecular formulas are the same. Usually, the molecular formula is a multiple of the empirical formula.   **LAW OF CONSERVATION OF MATTER**  It states that matter can neither be created or destroyed during chemical reaction but can be changed from one form to another. | The students ask questions for further clarification. | To create room for slow learners. |
| **Evaluation** | The teacher evaluates the students with the following questions;   1. Find the molecular formula of NO2. 2. State the law of chemical combination. | The students attempt the questions. | To ascertain their level of understanding. |
| **Conclusion** | The teacher concludes by coping the note on the board. She checks and marks the note. | The students copy the note on the board. | For future use. |
| **Assignment** | 1. Determine the empirical formula of an oxide of nitrogen containing 70% of oxygen, if the relative molecular mass of the oxide is 92, deduce its molecular mass. | The students did and submit their assignment for marking and correction. | To encourage the students to study at home. |