**Lesson plan**

**Course:** **SCH 3U**

**Unit:** Quantities in Chemical Reactions

**Topic:** Review

**Lesson:** Lesson

**Grade and Level:** Grade 11 University

**Date:**

|  |
| --- |
| **Description of Topic:** Today the students will review the unit |

|  |
| --- |
| **Learning Expectations** |
| **Overall Expectations:** |
| **Specific Expectations:** |

|  |  |
| --- | --- |
| **Teacher Resources:**  Laptop  LCD Projector  Chalk, chalk board, | **Student Resources:**  Pen, pencil  Calculator  Text book |

|  |
| --- |
| **Teaching / Learning Strategies** |
| -Note taking, problem solving, |

|  |
| --- |
| **Steps: (sequence, time lines, teacher/ student roles)** |
| 1. Review 2. Questions |

|  |
| --- |
| **Accommodations / Modifications** |
| -The students will be given an assisted note  -The lesson will be done on power point.  - The note will be posted on mrhoover.weebly.com |

|  |
| --- |
| **Assessment & Evaluation** |
| * The students questions will be checked for completion. |

**Questions:**  Page

**SCH3U: U2 Date:**

**Unit 2 Quantities and Chemical Reactions: Review**

**Law of definite proportions**

* A specific compound always contains the same elements in definite proportions by mass.
* This is always constant even if produced other ways.

**Relative Atomic mass**

* Relative atomic mass = the mass of an element that would react with a fixed mass of a standard element, currently **carbon-12.**

**Isotopic abundance**

* Some elements have isotopes. In calculating the relative atomic mass of an element with isotopes, the relative mass and proportion of each is taken into account. For example, naturally occurring carbon consists of atoms of *relative isotopic masses* C-12 (98.89%) and-C 13 (1.11%). Its relative atomic mass is 12.01 u.

**Atomic Mass and Molecular Mass**

* **Atomic Mass**
  + The mass of one atom of an element expressed in atomic units, u.
* **Molecular mass**
  + The mass of one molecule, expressed in atomic mass units, u.

**Molar mass (g/mol) = M**

* the mass, in grams per mole, of one mole of a substance. The SI unit for a mol is g/mol
* Molar mass is conventionally abbreviated with a capital M. For elements it is numerically equal to the atomic mass and is often called atomic mass units.

**Calculations involving Molar mass**

**Calculating Number of Entities and Avogadro’s number**

* N = nNA
* Number of entities = (# of mols) x(Avogadro's #)

**Law of Constant Composition**

* Says the same thing as the law of definite proportions.
* A compound contains elements in a certain fixed proportions (ratios) and in no other combinations, regardless of how the compound is prepared or where it is found in nature.

**Mass Spectrometer**

* An instrument that is used to measure the molar mass of a compound.

**Balancing Nuclear Equations**

**Percent Composition**

* Percent composition is the percentage in which an atoms mass contributes to the total mass of the molecule.

Can be calculated by masses found in lab results or by chemical formula.

**Calculating Chemical Formula’s**

* A chemical formula that represents the symbols of the atoms in the molecule and the ratio that they occur in their simplest whole number.
* This formula may not be the correct formula and may actually represent another compound that has the same percent composition.

Steps (3)

* 1. Find the mass of each element in 100g of the compound by using percent composition.
* 2. Find the amount of moles of each element by converting the mass in 100.0g to moles, using the molar mass of the element.
* 3. Find the whole-number ratio of atoms in 100g to determine the empirical formula. Reduce to lowest terms.

**Molecular Formula**

* A chemical formula that represents the symbols, and number of atoms that are covalently bonded to form a single molecule. The molar mass must be given
* **Steps**
* 1. Complete steps 1-3 for determining an empirical formula (In some cases this will be done for you)
* 2. Calculate the molar mass from the empirical formula
* 3. Compare the measured molar mass of the substance with the molar mass from the empirical formula. Increase the subscripts in the empirical formula by the multiple needed to make the two masses equal.

**Summary of Empirical and molecular formulas**

|  |  |  |
| --- | --- | --- |
|  | Empirical | Molecular |
| Formula: | Chemical formula in reduced terms | Full chemical formula |
| Things needed to find the formula: | - % composition of a compound. | 1. Percent composition and measured molar mass |
| Found by : | 1. Convert the % composition to mass by multiplying by 100g. 2. Then find the number of moles. Moles represent the atoms ratio in the compound. 3. Reduce if needed | 1. Find the Empirical formula 2. Calculate molecular mass of empirical formula 3. Compare with measured molecular mass  * multiply empirical formula by difference if needed. |

**What is Stoichiometry?**

* Stoichiometry is the quantitative description of the proportions by moles of the substances in a chemical reaction.

Step 1 Write Unbalanced Equation

Step 2 Balance equation, List given Values and Molar Masses

Step 3 Convert mass of given substance to amount of given substance.

**Step 4** Convert amount of given substance to amount of required substance.

**Step 5** Convert amount of required substance to the required value

**Limiting and Excess Reagents**

* When reactions are carried out in the lab or in real world situations we often have more of one reactant then we need for the reaction to go to completion. The reactant that we have in excess is called the Excess Reagent.

The reactant that is used up causing the reaction to stop is called the Limiting Reagent.

* **Step 1** Write the unbalanced chemical equation
* **Step 2** Balance equation, List given Values and Molar Masses
* **Step 3** Find the number of moles and fill in the table
* **Step 4** Use the mole ratios to calculate which reactant is the limiting reagent. The decision can be stated in two ways. We will do it once to get an answer, and then do it again to get a confirmation

When the limiting reagent is found you can then find the amount of product produced

* **Step 5** Convert amount of required substance to the required mass value

**Percentage Yield**

**Key terms: Pages 198 and 251**

**Questions: page 256 # 1-26**