



### Dimensional Analysis

The teacher reviews the basics of dimensional analysis with the students. The teacher reviews the metric system chart with students and shows them how to make simple conversions using a conversion factor. Emphasis is placed on the idea of cancelling out units by creating a ratio. The teacher completes several practice problems with the students, and then has them complete them individually. Emphasis is placed on converting within the metric system and converting grams to moles using the molar mass. The foundation in this prepares the students to complete stoichiometry.

### Balancing Equations & Stoichiometry

Next the students learn Stoichiometry. However, the teacher must first review balancing equations, as the first step in stoichiometry is to begin with a balanced equation. The teacher follows the same format for balancing equations and stoichiometry as they did for dimensional analysis. The teacher gives conceptual framework, examples problems, then review problems.

### Scavenger Hunt

Lastly the students participate in a scavenger hunt to review their skills in Stoichiometry. The students break into groups and must answer a stoichiometry problem, find the answer in the classroom, and then answer the next question on the back of the answer. Each answer has a letter and it will spell out a phrase when the scavenger hunt is completed. There are wrong answers as well, therefore the students must be accurate. This is a sample question from the scavenger hunt: "For the balanced equation shown below, how many grams of P will react with 86.4grams of O<sub>2</sub>?"  $4P + 3O_2 \Rightarrow 2P_2O_3$ .

### Hammond, Louisiana, United States

#### Introduction

My goal for this project was to help improve chemistry-education for high school students. With the help of a mentor chemistry teacher, I created an in-depth lesson plan with an assessment. The goal for this project was to be implemented in upward bound schools. I was going to use data from the assessments to make conclusions on how well the students performed and which methods of teaching students in chemistry class responded better to. Due to unforeseen circumstances the implementation portion could not be completed.

#### Standards

The state of Louisiana has set standards for high school students in a chemistry class to master. I focused on one standard for this project. The consensus from local high schools is that students are struggling with the math in chemistry. Therefore, I created a math review lesson plan, following the standard HS-PS1-7. HS-PS1-7. The standard states, "Emphasis is on using mathematical ideas as they relate to stoichiometry to communicate the proportional relationships between masses of atoms in the reactants and the products, and the translation of these relationships to the macroscopic scale using the mole as the conversion from the atomic to the macroscopic scale."

#### Lesson Plan Format

The students are given an outline that has their standards and objective listed at the top. The students will follow the PowerPoint that is aligned with the outline. The outline consists of several concepts, definitions, and practice problems. The lesson plan consists of an introduction on the measurement of moles. Students explore various chemicals that all equal "1 mole" but consist of different grams. The teacher reviews the measurement of the mole with students and relates it to Avogadro's number. The teacher reviews dimensional analysis, balancing equations, and stoichiometry with students. The students go on a Stoichiometry scavenger hunt after the review. The students are then assessed with a formal assessment on dimensional analysis, balancing equations and stoichiometry.

### Formal Assessment

Once the student completes the scavenger hunt, they will participate in a formal assessment to conclude the level of retention after the interactive lesson plan. The goal is a 75% pass rate for a high school chemistry class. This is a sample of the formal assessment questions they will answer.

- 1) How many moles are in 64.3 grams of Sulfur?
- 2) Balance the following chemical equation:  
 $Cr_2O_3 + Mg \rightarrow Cr + MgO$
- 3) For the balanced equation shown below, how many grams of O<sub>2</sub> will react with 187 grams of NH<sub>3</sub>?  
 $4NH_3 + 5O_2 \Rightarrow 4NO + 6H_2O$

### Conclusion

The goal for this project is to be eventually implemented in Upward Bound local high schools for it to be accurately assessed and to receive data. The idea is to answer questions such as, "What is the best method to teaching introductory chemistry?" "How much practice is required to retain a chemistry skill?" The lesson plan will hopefully help students receive a strong foundation in chemistry.

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