Lesson Title	Don't be a Stoic about Stoichiometry
Length of Lesson	1 hour 15 min
Created By	Chris Ruhs
Subject	Chemistry
Grade Level	10-12th Grade
State Standards	Chemistry I: 8e
DOK Level	DOK 2
DOK Application	Students demonstrate their knowledge of stoichiomtry
National Standards	9-12: A (Inquiry); B (Physical Science)
Graduate Research Element	Understanding stoichiometry is essential for any type of chemist, including a biogeochemist. Specifically, I must be able to explain and predict chemical reactions in the environment from a stoichiometric basis, as well as be able to perform bench scale investigations.

Student Learning Goal:

MS 9-12th Grade:

Chemistry I: 8 (e) Solve stoichiometry problems. *Students will learn and apply concepts of stoichiometry to solve problems and perform investigations.*

National Science Education Standards of Content 9-12:

A: Inquiry: Design and Conduct Scientific Investigations. *During the formative discussion, students will be asked how stoichiometry problems relate to real life, and how one could design and experiment to prove that stoichiometry is robust.* B: Physical Science: Chemical Reactions. *Students will setup and monitor chemical reaction, taking measurements, recording observations, and drawing conclusions.*

Materials Needed (supplies, hand-outs, resources):

Bunsen burners, strikers, mass balances, beakers, crucibles, watch glasses, magnesium ribbon, sodium bicarbonate, potassium chlorate.

Lesson Performance Task/Assessment:

Formative:

1. Discussion on stoichiometry with emphasis on mass balance and molar predictions (what we can predict by observing the change in moles, especially with gases)
2. Review balancing equations
3. Work through a few problems together, allowing for questions.

Summative:

1. Laboratory exercises involving three chemical reactions, allowing students to work in teams, where each student gets to lead one reaction, while others write down observations and make measurements.

2. Students will fill out a worksheet which guides them through the different activities.

Lesson Relevance to Performance Task and Students:
A conceptual, conversational approach to this topic followed by example problems will allow students to understand the basis for stoichiometry. Laboratory exercises will allow students to see how conceptual stoichiometry translates into real-world stoichiometry.

Anticipatory Set/Capture Interest:
A running Bunsen burner will get students attention and get them thinking about what's actually going on during a combustion reaction.

Guided Practice:
Conversation and example problems will serve as guided practice.

Independent Practice:
Students will work in teams to demonstrate correct understanding and application of stoichiometry in the lab.

Remediation and/or Enrichment:
Remediation:
Individual IEP, focus on one simpler examples, focus on just one laboratory exercise.

Enrichment: segue into discussion on more complicated problems, relate stoichiometry to important everyday chemical reactions, get students thinking about how molar ratios allow chemists to predict outcomes, especially when gases are evolved.

Check(s) for Understanding:
How do you balance an equation?
Is mass conserved during chemical reactions?
What can be predicted from observing the moles in a balanced chemical reaction?

Closure:
A student-lead, teacher-guided summary discussion will bring closure to the lesson plan.

Possible Alternate Subject Integrations:
Biology: biological reactions, though more complicated, work on the same basis

Teacher Notes: