Lesson Title	Hydrate Lab
Length of Lesson	90 minutes
Created By	David Wilson
Subject	Chemistry / Physical Science
Grade Level	9-12th Grade
State Standards	3d / 5a
DOK Level	3 / 1
DOK Application	Develop / Investigate and Apply
National Standards	K-12: Unifying Concepts and Processes / 9-12: A: Science as Inquiry
Graduate Research Element	An understanding of the properties of water within hygroscopic crystals and solutions is essential to protein research.

Student Learning Goal:

State Standards: (Chemistry)

3) Develop an understanding of the periodic table.

d. Use stoichiometry to calculate the amount of reactants consumed and products formed. (DOK 3)

State Standards: (Physical Science)

5) Investigate and apply principles of physical and chemical changes in matter.

a. Write chemical formulas for compounds comprising monatomic and polyatomic ions. (DOK 1)

National Science Standards: (K-12)

Unifying Concepts and Processes:

As a result of activities in grades K-12, all students should develop understanding and abilities aligned with the following concepts and processes:

- **Systems, order, and organization**
- **Evidence, models, and explanation**
- **Constancy, change, and measurement**
- Evolution and equilibrium
- Form and function

National Science Standards: (9-12)

A: Science as Inquiry: Abilities necessary to do scientific inquiry.

- FORMULATE AND REVISE SCIENTIFIC EXPLANATIONS AND MODELS USING LOGIC AND EVIDENCE. Student inquiries should culminate in formulating an explanation or model. Models should be

physical, conceptual, and mathematical. In the process of answering the questions, the students should engage in discussions and arguments that result in the revision of their explanations. These discussions should be based on scientific knowledge, the use of logic, and evidence from their investigation.

Materials Needed (supplies, hand-outs, resources):
{**WARNING**: Please read the MSDS of any chemical before using it.}
[Chemicals needed]
$CuSO_4 \cdot 5H_2O$
[Quantities of the following supplies listed are per each group.]
ring stand, iron ring, clay triangle (if the iron ring is large), evaporating dish, watch glass, balance, container for $CuSO_4$, spatula

Lesson Performance Task/Assessment:
1) Students will investigate the properties of hydrates.
2) Students will calculate the formula of a hydrate based on experimental data.

Lesson Relevance to Performance Task and Students:
The students are learning the to write formulas or ionic compounds. They are also learning about the difference types of bonding. They will have been through percent composition by the time they do this lab. So, this lab will give them practical experience with the properties of a different type of bonding, determining formulas from experimental data, and percent composition calculations.

Anticipatory Set/Capture Interest:
They will have pre-lab questions informing them of how to do this lab the night before for homework. They will also prepare a $CoCl_2$ barometer the previous day.

Guided Practice:
At this point, the students will have gone over the properties of ionic and covalent compounds in class. They will have gone over hydrates, and the calculations necessary to perform the lab.

Independent Practice:
The purpose of this lab is to give the students experience in applying the principles they will have learned up to this point. So, the entire lab is an exercise in independent practice.

Remediation and/or Enrichment:
Remediation: Individual IEP.
Enrichment: (I can't think of anything for this. I'm not good at this part.)

Check(s) for Understanding:
Post-lab questions and the data tested will be used to evaluate student understanding.

Closure:
The post-lab questions and the class review of those questions will serve as the closure.

Possible Alternate Subject Integrations:
This lesson is purely physical science.

Teacher Notes: