**APES**

**Hydrate Lab**

**Purpose:** The purpose of this activity is to become familiar with hydrates and to learn how to test a substance to see if it is a hydrate.

**Background:**

When certain substances form from a solution, they will sometimes combine with water. These substances are known as hydrates and the water that is loosely attached to the molecule is called the water of hydration. You can determine if a substances a hydrate by looking at its molecular formula. Copper sulfate (CuSO4 •5H2O) is a hydrate and is identified by the 5 water molecules that are loosely attached to each copper sulfate molecule. Some minerals are also hydrates and can be identified as such through their chemical formulas. In this lab activity, you will learn how to identify a hydrate without looking at its molecular formula.

**Procedure:**

1. Place a small sample of CuSO4 into a clean dry test tube.
2. Keeping the mouth of the test tube lower than the base, gently heat the crystal over a Bunsen burner flame.
3. Within the first 30 seconds of heating, you should observe something inside the test tube that indicates that CuSO4 •5H2O is a hydrate. Record this observation under #1 of the conclusion section below.
4. Continue heating the CuSO4 •5H2O until the color change is complete.
5. Keeping the mouth of the test tube lower than the base, set the test tube aside to cool for at least 5 minutes.
6. Repeat steps 1-3 above for Halite, MgSO, and at least two different mineral chips. DO NOT HEAT ANY of the substances for more than 30 seconds.
7. Add 2-3 drops of the water to the first test tube. Use your observations to answer conclusion questions 2-5.

**Conclusion:**

1. What did you observe while heating CuSO4 •5H2O that showed that it is a hydrate?

2. What color did the CuSO4 •5H2O turn while being heated?

3. What happened to the CuSO4 •5H2O when you added water to the test tube?

4. What do you think gives the CuSO4 •5H2O its blue color?

5. Why is it so important to keep the mouth of the test tube lower than the base?

6. Is Halite a hydrate? Explain how you reached this conclusion.

7. Is MgSO4 a hydrate? Explain how you reached this conclusion.

8. Identify each of the mineral chips you tested and tell if they are hydrates or not. You may need to use the key to help identify the mineral.

9. Look at the Guide to Common Minerals on page 309 of your textbook. Which of the minerals listed would be considered a hydrate

10. How do you think this mineral is frequently formed in nature (clue on page 308)?