Lab: Mineral Investigation

FOR THE TEACHER

Summary
In this lab, students will put their problem solving skills to work as a team to determine how many specific samples of ore can be made from a lode equivalent to the size of their classroom. This lab is perfect for the start of the school year to engage students in real-life applications of chemistry, as well as essential mathematic and measurement skills.

Grade Level
High School

Objectives
By the end of this lab, students should be able to
- Understand the connection between common products and samples of ore.
- Critically analyze a given problem, and complete appropriate calculations for mass and volume.

Chemistry Topics
This lab supports students’ understanding of
- Measurement
- Percent Composition

Time
Teacher Preparation: 10-20 minutes (varies depending on access to ore samples)
Lesson: 40 minutes

Materials
- Ore Sample
- Associated Products (ex: aluminum soda cans, steel pliers, iron magnets, copper wire, copper piping, galvanized supports – see teacher notes for explanation)
- Graduated Cylinder
- Electronic Scale
- Measuring Tape
- Calculator
- Overflow Can

Safety
- Always wear safety goggles when handling chemicals in the lab.
- Students should wash their hands thoroughly before leaving the lab.
- When students complete the lab, instruct them how to clean up their materials and dispose of any chemicals.
Teacher Notes

- This lab is a great way to start the school year and introduce students to chemistry; I have students complete it on the first day of school.
- Give each lab table or lab group a different product and/or different ore sample.
- For example, if they also have bauxite ore they may have an aluminum pop can as the product. If their ore sample is hematite, 69.9% iron or magnetite, 72.3% iron, their product might be a steel vice-grip, or an iron magnet. If their ore is chalcopyrite, 34.6% copper their product may be copper pipes or copper wire. If their ore is sphalerite, 72.3% zinc, their product may be galvanized supports.
- *Note* that the student procedures are designed assuming that the students have a sample of bauxite ore, and an aluminum pop can. The procedures will need to be adjusted if you are using a different sample of ore, and a different corresponding product.

FOR THE STUDENT

Lesson

Mineral Investigation

Problem

- Using the given lab equipment, and a sample of ore work with your group to solve the problems given below.

Materials

- Ore Sample:
  - Bauxite (34.6% Aluminum)
  - Hematite (69.9% Iron)
  - Magnetite (72.3% Iron)
  - Chalcopyrite (34.6% Copper)
  - Sphalerite (72.3% Zinc)
- Associated Metal Products
- Graduated Cylinder
- Electronic Scale
- Measuring Tape
- Calculator
- Overflow Can

Safety

- Always wear safety goggles when handling chemicals in the lab.
- Wash your hands thoroughly before leaving the lab.
- Follow the teacher’s instructions for cleanup of materials and disposal of chemicals.

Procedure

1. At your lab table, you will find a sample of bauxite ore which is 34.6% aluminum.
2. **Problem 1:** Determine how many grams of bauxite can be extracted from a lode of ore the size of this classroom.

3. Record any data collected, as well as any necessary calculations in the table below.

4. **Problem 2:** Determine how many grams of aluminum can be extracted from this lode.

5. Record any data collected, as well as any necessary calculations in the table below.

6. **Problem 3:** On your lab table is an aluminum cupcake pan. Determine how many of these cupcake pans could be made from the aluminum extracted from the lode.

7. Record any data collected, as well as any necessary calculations in the table below.

**Data & Calculations**

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**Conclusion**

Explain how you were able to solve these problems: