**Answer Key: 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.
SAMPLE Data & Calculations

Problem 1:

Step 1: Determine volume of classroom: \(l \times w \times h\) (example data 1200cm x 800cm x 300cm) = \(2.88 \times 10^8\) cm\(^3\)

*Note to teacher: students will likely measure using a meter stick or yard stick, and should show the conversion to cm.

Step 2: Determine the mass of your bauxite sample by placing it on the scale. Example 110.81 g

*Note to teacher: the density of bauxite is 1.281 g/cm\(^3\)

Step 3: Determine volume of your bauxite sample via water displacement. Example = 86.5 ml, or 86.5 cm\(^3\)

Optional: Students may use their calculated values from step 2 and 3 to determine the density of bauxite. In this example: \(D = \frac{m}{v} = \frac{110.81\, g}{86.5\, cm^3} = 1.281\, g/cm^3\)

Step 4: Solve for the mass of bauxite that would occupy the calculate volume of the classroom:

\[
x / 2.88 \times 10^8\, cm^3 = 110.81\, g / 86.5\, cm^3
\]

\[
x = 3.69 \times 10^8\, grams\, of\, bauxite
\]

OR

\[
2.88 \times 10^8\, cm^3 \times 1.281\, g/cm^3 = 3.69 \times 10^8\, grams\, of\, bauxite
\]

Problem 2:

Calculate 34.6% (aluminum percent composition) of total 3.69 \times 10^8 grams bauxite sample

\[
= 0.346 \times (3.69 \times 10^8\, grams)
\]

\[
= 1.28 \times 10^8\, grams\, aluminum
\]

Problem 3:

Example data collected: 1 cupcake pan has a mass of 425 grams

\[
1.28 \times 10^8\, grams\, aluminum \times 1\, cupcake\, pan / 425\, grams = 3.01 \times 10^5\, cupcake\, pans
\]

Conclusion

Explain how you were able to solve these problems:

See above.