

Fundamental Chemistry
Chapter 11 – Mole Concept

11.4 How Many Atoms??

Objective: To calculate the number of atoms in a piece of Al foil

Procedure:

Part A

1. Mass an aluminum block
2. Fill a 100 mL graduated cylinder to 50.0 mL
3. Place the block into the cylinder and record the new volume

Part B

4. Measure and cut a piece of aluminum foil 10.00cm x 10.00 cm
5. Mass the piece of foil

Data:

1. Mass of Block (g)	
2. volume of cylinder empty (mL)	50.0 mL
3. volume of cylinder and block (mL)	
4. length and width of foil (cm)	
5. mass of foil (g)	

Data Analysis

1. density of aluminum
2. volume of the foil = mass of foil/ density of Al
3. thickness of foil (h)
$$\text{Volume} = l \times w \times h$$
$$h = \text{volume} / l \times w$$

4. One Al atom is 2.5×10^{-8} cm thick. Use the following to calculate how many atoms thick the piece of foil is

$$\text{Number of atom thick} = h \text{ (cm)} \times \frac{1 \text{ atom}}{2.5 \times 10^{-8} \text{ cm}}$$

5. How many moles are in the foil? (hint: Convert grams to moles)

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11.5 Copper and Iron Atoms

Objective: To calculate the number of copper and iron atoms in a chemical reaction

Procedure

1. Determine the mass of a 150 mL beaker.
2. Obtain a nail and find its mass
3. Place the nail in the bottom of the beaker, bend if necessary so it lies flat on the bottom
4. Your teacher will add the copper chloride solution to the beaker
5. Let the beaker stand for at least 15 minutes
6. Observe the reaction
7. Using tongs, pick up the nail and rinse off the copper into the beaker. Set it aside on a paper towel to dry.
8. Let the solution settle. Mass the dry nail
9. Decant the solution into another beaker.
10. Rinse the copper and the sides of the beaker with water from a wash bottle
11. Let the copper settle as before and decant into the waste beaker.
12. Repeat steps 10-11 two more times
13. Rinse the copper with a small amount of 1.0 M HCl and decant as before
14. Repeat steps 10-11 two more times
15. Allow the washed copper to dry in the beaker overnight.
16. Mass the dry copper and beaker

Data

	Mass (g)
Mass of beaker	
Mass of nail before reaction	
Mass of nail after reaction	
Mass of copper and beaker	

Data Analysis

1. Write a word equation for this reaction
2. What type of reaction is this?
3. Write a balanced equation for this reaction
4. Calculate the mass of nail reacted
5. Calculate the moles of nail reacted
6. Calculate the mass of copper formed
7. Calculate the moles of copper formed
8. How many particles are in one mole of anything
9. How many atoms of iron reacted?
10. How many atoms of copper were formed?