

Name: _____

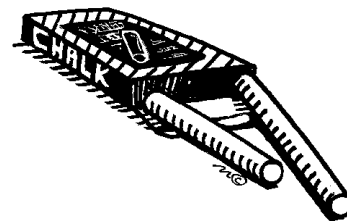
Date: _____

Chemistry

Particles of Chalk Activity

Introduction

Every time we interact with matter, we're moving atoms around! Sometimes we can take advantage of the weak structures of certain types of matter by forcing some particles to be left behind in a trail to record our handwriting. Examples of this method are pencils (graphite), pens (ink), and chalk (calcium carbonate, or CaCO_3). In this activity, you will determine the number of atoms left behind by using chalk to write a sentence or small self-portrait on the chalkboard.



Pre-Activity Questions & Prediction

1. In terms of its structure, why do you think chalk is used to write on blackboards as opposed to granite or sandstone?
2. In order to complete the calculations in this activity, we have to make several major assumptions about our procedure. Name one of these assumptions and explain why we must use it.
3. Prediction: When you write on the board with chalk, approximately how many atoms do you think you'll put up there? (answer with a number, not words, e.g. "a lot") Why do you think so?

Procedure

1. Using the high-precision balance, determine the mass a piece of ordinary chalk. Record this mass here: _____
 2. Either:
 - a) Complete ONE of the following sentences by filling in the blanks and then write the **entire** sentence on the board:
 - My favorite food is _____.
 - I have a pet named _____.
 - Someday, I want to travel to _____.
- OR -**
- b) Draw a SMALL stick-figure portrait of yourself on the board.
3. After you're done on the board, determine the mass of the piece of chalk again. Record this mass here: _____

Calculations (Show all work and circle your answers!)

1. Using your data, calculate the grams of chalk (calcium carbonate) you used.
2. Using the molar mass of calcium carbonate, calculate the number of moles of chalk you used.
3. Using Avogadro's number, calculate the number of formula units of chalk you used.
4. Knowing the total number of atoms in one formula unit of calcium carbonate, calculate the number of atoms you put on the board.
5. The density of ordinary solid chalk is 2.499 g/cm^3 . Using the density equation ($D = \frac{m}{V}$), how many cubic centimeters of chalk (V) did you place on the board?

Questions

1. Describe how could you apply this method to measuring the particles of graphite left behind on paper when you write with your pencil.
2. Why do you think your values for Calculations #1, #2 and #5 were so small, while your values for Calculations #3 and #4 were so large?
3. Besides pencils and chalk, name four other things you use on a daily basis for which you could calculate the number of atoms used.