The Mol and Avogadro's Number

Discussion

The gram relative weight of a substance is defined as the relative weight expressed in grams. For example, if something has a relative weight of 2 then its gram-relative weight would be 2 grams; and if you were to mass out one gram-relative weight of this substance you would be massing out 2 grams of it. Likewise, if another substance had a relative weight of 32, like the sulfur atom, 32 grams of this substance would be equal to one gram-relative weight of it. Based upon this definition of gram-relative weight it is possible to complete line three of the chart below.

Procedure

1. Set up a system of relative weights for the following objects: tack, clip, bead. This can be accomplished by:

    1. Finding the actual mass of each object
    2. Choosing one of the objects as a standard for comparison and giving it an arbitrary relative weight.
    3. Use ratio and proportion to find the relative weight of each of the other objects.

2. Based upon the definition of g-relative wt. in the discussion above fill in line 3 of the chart.
3. Mass out one g-relative weight of each of the three substances and fill in line four of the chart by counting the number of "atoms" present.

	Bead	Tack	Clip
actual mass (G)			
relative weight			
gram-relative weight (G)			
"atoms" in 1 g-rel. wt.			

Questions

1. What conclusion can you come to about the usefulness of the definition given for "gram-relative weight"?
2. Compare your results to those of other students.
3. What determines the value arrived at in line four of the chart?
4. Where would these be found on the periodic table? Why?

COLLEGE-PREP CHEMISTRY
The Monstrous Mole

1. If you could spend one billion dollars ($1,000,000,000) every second, how many years would it take you to spend a mole of dollars?

2. Could you put a mole of pennies in the lecture portion of our chemistry room? If not, how many classrooms would it take? Assume that the classroom is rectangular and is devoid of objects such as chairs, cabinets, etc.

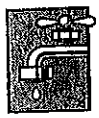
   Classroom dimensions - Height - 300 cm
   Width - 627 cm
   Length - 1237 cm

3. What is the weight of one mole of corn kernels? Would one mole of corn kernels fit in the Mitchell elevator?

   The Mitchell elevator holds 625,000 bushels of corn.
   One bushel of corn weighs 56 pounds.

4. How many times would 1 mole of linked paper clips go around the earth?

How Long Does it Take for a Drop of Water to Evaporate?



Question: If a drop of water evaporates at the rate of one million molecules per second, then how long will it take for the drop to disappear?

How big is a drop of water? How could we determine this? You may use the equipment made available by the teacher to answer this.

How could you figure out how many molecules there are in a drop of water?

How would you determine how long it takes on drop to evaporate? Show your work to get credit!

Bonus: If a drop of water evaporates in 15 minutes, what is the evaporation rate in molecules/second?

How Many Molecules of Water Are in Lake Erie?
Concept Development

Problem:

How do you determine the number of molecules of water in Lake Erie?

Materials:

water
balance
eyedropper
beaker
graduated cylinder

Procedure:

Utilizing the equipment listed above and the following information, determine the number of molecules of water in Lake Erie.

Helpful Information

* One mole of anything contains 6.02×10^{23} units.
* One mole of water has a mass of 18.02 grams.
* Lake Erie has an average depth of 18 m.
* Lake Erie covers 2.6×10^{4} km^2.

Hold it a minute! Are you sure that you have all of the information you need? There might be more data needed from the lab. Think about it.

Don't forget to prepare a data table. Utilize the factor label method in all of your calculations.

Summing Up:

1. How many drops of water are in 2 L?

2. How many drops of water are in Lake Erie?

3. How many molecules of water are in Lake Erie?

4. How many moles of water are in Lake Erie?

5. The recommended daily allowance of water is about 2 L. How many molecules of water should you drink each day?