

## Moles, Molecules, and Grams Lab

As we've discussed in class, it's easy to make conversions between moles, molecules, and grams. For example, if we want to go from moles to grams, we use the molar mass to make this conversion. If we want to go from moles to molecules, we use Avogadro's number, or  $6.02 \times 10^{23}$ . Finally, if we want to go from grams to molecules, we use a two step process where we first convert from grams to moles, then from moles to molecules.

In this lab, we will be weighing samples of five different substances, then finding out how many moles and molecules of each one are present.

### **Prelab:**

If you weighed 25 grams of sodium hydroxide in this lab, how many moles of sodium hydroxide would you have? How many molecules?

### **Lab:**

In this lab, your job will be to weigh five substances and determine the number of moles and molecules present in each sample. You may find the following information handy during this lab:

Substance	Chemical Name	Formula
alcohol	ethanol	$C_2H_5O$
salt	sodium chloride	$NaCl$
sand	silicon dioxide	$SiO_2$
water	water	$H_2O$
sugar	sucrose	$C_{12}H_{22}O_{11}$

**Data Table:**

Make a data table that contains the name and formula of each substance, the molar mass of each substance, and the mass in grams of each substance. It is important that your data table is complete, as you will need this information to find the number of moles and molecules of each substance in the next section!

**Calculations: Using your data, find the following values**

Number of moles of ethanol: \_\_\_\_\_

Number of molecules of ethanol: \_\_\_\_\_

Number of moles of salt: \_\_\_\_\_

Number of molecules of salt: \_\_\_\_\_

Number of moles of water: \_\_\_\_\_

Number of molecules of water: \_\_\_\_\_

Number of moles of sand: \_\_\_\_\_

Number of molecules of sand: \_\_\_\_\_

Number of moles of sugar: \_\_\_\_\_

Number of molecules of sugar: \_\_\_\_\_

**Post Lab Questions:**

- 1) Which of the molecules had the largest number of molecules? Was it the one with the largest mass? Explain.

- 2) Can you think of a case where it might be handy to know the number of moles you had of a substance? Explain.
- 3) Water has a molecular formula of  $\text{H}_2\text{O}$ . If I have 50 grams of water, how many moles of water do I have? How many molecules?
- 4) Natural gas has a formula of  $\text{CH}_4$ . If I have 50 grams of natural gas, how many moles of natural gas do I have? How many molecules?
- 5) I had the same weight of water and natural gas in problems 3 and 4. Why didn't the answers come out the same? Explain.