Mole Conversion

Web Quest

What the heck is a mole? We have Avagadro ( and others) to thank for this……..

6.02 x 1023 is the number of “things” per mole of the substance.

Here is a tutorial for an over view and for a reference as you work through these problems

<http://www.wiley.com/college/chem/spencer053872/tutorial/gramsmoles/gramsmoles1.html>

We can use this to do mathematical conversions to determine mass, volume, and number of atoms or molecules in a given substance. For example let’s check out this video to convert moles methane (CH4) to grams of methane. <http://www.sciencegeek.net/Chemistry/Video/GMV1.swf>

Once you have finished the video let’s practice by completing these problems (be sure to include units!):

1. How many moles are represented by 16.0 g of ethanol, C2H5OH ?

2. How many moles of NaCl are in 16.0 grams of NaCl?

3. How many moles of potassium hydroxide, KOH are in 40.6 g?

4. How many moles of glucose, C6H12O6 are in 27.2 g of glucose?

How are we doing? How about the opposite? What if you want to determine the mass of a substance that is represented by moles? Check this video out…………..

<http://www.sciencegeek.net/Chemistry/Video/GMV1.swf>

Once you are finished let’s practice it again….

1. How many grams in 0.158 moles of KMnO4?
2. How many grams in 1.2 moles of H2O?
3. How many grams in 0.87 moles of H2O2?
4. How many grams in 0.43 moles of C6H12O6?

How about determining the number of atoms or molecules present in a given sample? Remember that there is 6.02 x 1023 of “something” present in a mole. So a mole of atoms = 6.02 x 1023 atoms and a mole of molecules = 6.02 x 1023 molecules. Let’s go check out another video…..

Atoms to moles first: <http://www.sciencegeek.net/Chemistry/Video/GMV5.swf>

Now molecules to moles: <http://www.sciencegeek.net/Chemistry/Video/GMV6.swf>

Ready for these?

1. How many moles of methanol, CH3OH, are there in 6.53 x 1023 molecules of methanol?
2. A sample containing 0.75 moles of CO2 would contain how many molecules?
3. How many Fe atoms would be present in 1.27 moles of Fe?
4. 4.47 x 1023 molecules of C6H12O6 would be how many moles?

Now it is time to expand your minds. If you understand the previous problems then we are ready for the next step. Is it possible to convert atoms to mass or vice versa? You cannot do the conversion directly. You first have to convert either mass or atoms/molecules to moles first. Then from moles you can convert in either direction. KEEP TRACK OF YOUR UNITS!

 Yet another video…. <http://www.sciencegeek.net/Chemistry/Video/GMV7.swf>

Time for some more practice:

1. How many grams of glucose are in 6.63 x 1023 molecules of glucose, C6H12O6?

2. Determine the number of molecules found in a 12.4 g sample of H2SO4.

3. 3.14 x 1023 molecules of CO2 are produced in a chemical reaction. How much would the sample weigh in grams?

4. How many atoms are in a 39.8 g sample of Fe?

Can I apply this somehow to volume? Well at standard temperature and pressure (STP) a mole of a gas will occupy 22.4 liters. So If we keep our units straight we should be able calculate a given volume of gas from moles. Check it out…… <http://www.sciencegeek.net/Chemistry/Video/GMV3.swf>

1. Convert 427 Liters of CO2 to moles.
2. 37 liters of O2 to moles.
3. How about 3.4 moles of CO to liters?
4. 122 moles of Methane to liters?

What about converting a given volume of gas to mass or a given mass to volume? Once again you have to get to that common ground first, which is the mole.

http://www.sciencegeek.net/Chemistry/Video/GMV8.swf

1. How many molecules are in 22.4 liters of methane?
2. 3.58 x 1023 molecules of propane C8H8 would occupy how much space at STP?
3. You collect 14.2 liters of CO gas from an experiment. How many molecules would be in the sample?
4. 28 grams of H2 are produce from an experiment. How much volume would they displace at STP?