

HOW TO DO IT
MOLECULAR WEIGHTS AND MOLES

A. CALCULATING MOLECULAR WEIGHTS:

1. Start by writing down the correct formula:
For covalent compounds with prefixes like “di-“ and “tri-“, ignore charges and just count the atoms indicated by the prefixes (see nomenclature handout).
For all other compounds, figure out what ions are present, with their charges:
Positive ions are listed first. If a Roman numeral is present, it stands for the charge.
Acids beginning with “hydro-“ have a single-atom anion (or cyanide).
Acids ending in “-ic” have anions ending in “-ate”, except as noted above.
Acids ending in “-ous” have anions ending in “-ite”.
“Criss-cross” the charges to write the correct formula; remember parentheses!
2. Multiply the atomic weight of each element by the number of times it occurs in the formula:
A subscript following an element multiplies just that one element.
A subscript following parentheses multiplies everything in the parentheses.
A coefficient in front of a formula multiplies the entire formula.
Unless instructed otherwise, you may round atomic weights to two places (hundredths).
3. Add up the weights of all the elements to get the total.
The total is in “atomic mass units” (amu), equivalent to grams per mole.
You can also write “1 mole =”, then the molecular weight, then “grams”.

B. CONVERTING BETWEEN MOLES AND GRAMS:

The molecular weight is a conversion factor to convert moles to grams, or grams to moles. See the example below.

EXAMPLE: How many moles are there in 175. g of sulfuric acid?

An acid ending in “-ic” has ions ending in “-ate”. Sulfuric acid has sulfate ions, SO_4^{2-}

Switching the charges gives the formula H_2SO_4 .

$$\text{H} = 1.01 * 2 = 2.02$$

$$\text{S} = 32.07 = 32.07$$

$$\text{O} = 16.00 * 4 = \underline{64.00}$$

$$\text{Total MW} = 98.09 \text{ g/mol}$$

$$1 \text{ mole} = 98.09 \text{ g}$$

$$175. \text{ g} * (1 \text{ mole} / 98.09 \text{ g}) = 1.78 \text{ moles, to 3 sig. figs.}$$