

Steps to determine an empirical formula

- The subscripts in a formula can represent a *mole ratio*
 - They give the number of moles of atoms of each element “contained” in one mole of the compound
- Example: 1.0 mole of Na_2SO_4 contains:
 - 2 moles of Na atoms
 - 1 mole of S atoms
 - 4 moles of O atoms
- Our job in determining an empirical formula is to determine this mole ratio from mass data

Step 1

- Calculate the number of moles of each element present in the compound
 - Carry 3 – 4 decimal places at this point

Step 2

- Divide all the numbers of moles of each element (from step #1) by whichever is *smallest*
- *This ensures our smallest answer, and therefore our smallest subscript, is a 1*

If...

- If all of the answers from step 2 are whole numbers, those whole numbers are the subscripts in the formula
- Rounding is done differently at this point!
 - Round up at 0.9
 - Round down at 0.1
 - Do NOT round off numbers between 0.1 and 0.9

If...

- If the answers from dividing all the number of moles by the smallest (step 2) are NOT whole numbers, multiply ALL of the answers from step 2 by the same small whole number (ex: 2, 3, 4...) until you arrive at a whole number ratio.
- Those numbers are the subscripts in the empirical formula