Empirical Formula Notes

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Definition:

What does it mean?

When do you have empirical formula:

Step to Calculate Empirical Formula

1. Change mass percent (%) to actual masses or use given masses directly

- Assume 100.g compound (cpd)

2. Change mass of element to mole of element

3. Change moles to molar ratio.
   - Take smaller mole number and divide this number into all other mole number.

4. If all numbers are not whole, you need to determine a single number that you can multiple to all mole numbers so that the resultant number are **ALL WHOLE**.
   - Need to determine which number. The key is the following decimal to fraction conversion.
     - 1/6 (0.167)
     - 1/5 (0.200)
     - 1/4 (0.250)
     - 1/3 (0.333)
     - 2/5 (0.400)
     - 1/2 (0.500)
     - 3/5 (0.600)
     - 2/3 (0.666)
     - 3/4 (0.750)
     - 4/5 (0.800)
     - 5/6 (0.830)

Example from board

What is the Empirical Formula (EF) of the compound that is 25.9% nitrogen and 74.1% oxygen? (In other words, for N_xO_y, solve for x and y)

Step 1 $\longrightarrow$ 25.9% N and 74.1% O

Assume : 100.g cpd

$N : \left(25.9\,gN\right)\left(\dfrac{1\,mol\,N}{14\,g\,N}\right) = 1.85\,mole\,N / 1.85\,mol\,N = (1)2 = 2$

$O : \left(74.1\,g\right)\left(\dfrac{1\,mol\,O}{16\,g\,O}\right) = 4.63\,mol\,O / 1.85\,mol\,N = (2.50)2 = 5$

Step 2   Step 3   Step 4

$$E.F. = N_2O_5$$