

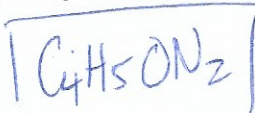
Chemistry 11  
Mole V Check Point  
✓ Empirical Formula

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1. A sample of caffeine is analyzed and found to contain 1.4844g C, 0.1545 g H, 0.4947g O and 0.8661g N. Determine the empirical formula of caffeine.

$$\text{C: } 1.4844\text{g} \times \frac{1\text{mol}}{12.01\text{g}} = 0.1236\text{mol C}$$



$$\text{H: } 0.1545\text{g} \times \frac{1\text{mol}}{1.01\text{g}} = 0.1545\text{mol H}$$

$$\text{O: } 0.4947\text{g} \times \frac{1\text{mol}}{16.00\text{g}} = 0.03092\text{mol O}$$

$$\text{N: } 0.8661\text{g} \times \frac{1\text{mol}}{14.01\text{g}} = 0.06182\text{mol N}$$

$$\text{C: } \frac{0.1236}{0.03092} = 3.99 \quad \text{H: } \frac{0.1545}{0.03092} = 4.99 \quad \text{N: } \frac{0.06182}{0.03092} = 1.99$$

$\quad \quad \quad = 4 \quad \quad \quad = 5 \quad \quad \quad = 2$

2. Given that the molar mass is 194.19g/mol, determine the molecular formula of caffeine.



$$\text{molar mass: } (4 \times 12.01) + (5 \times 1.01) + (2 \times 14.01) + (1 \times 16.00)$$

$$= 97.11\text{g/mol}$$

$$\frac{194.19\text{g/mol}}{97.11\text{g/mol}} = 1.99 = 2$$

