

Name KEY

1. Name the following compounds. [3 pts]

Formula	Name
KCl	potassium chloride
Cu(NO ₃) ₂	copper(II) nitrate
N ₂ O	dinitrogen monoxide

2. True or False. [3 pts]

a) FeO is iron(I) oxide.

FALSE, FeO is iron(II) oxide

b) The subscript 3 in the formula NH₃ indicates that there are 3 moles of H in 1 mole of the compound.

TRUE

c) Consider the reaction, N₂ + 2O₂ → N₂O₄. If 5.00 moles of O₂ are reacted with excess N₂, 10.0 moles of N₂O₄ will be produced. (Assume complete reaction)

FALSE, if 5.00 moles of O₂ are reacted with excess, N₂, 2.50 moles of N₂O₄ will be produced.

3. What is the mass (in g) of 0.545 moles of titanium (Ti)? **Homework Problem** [2 pts]

$$0.545 \text{ mol Ti} \times \frac{47.88 \text{ g Ti}}{1 \text{ mol Ti}} = \mathbf{26.1 \text{ g Ti}}$$

4. How many **O atoms** are in 2.00 moles of N₂O₄? Circle the correct answer. [3 pts]

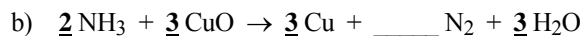
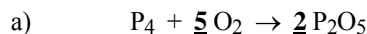
a) 7.53×10^{22} b) 6.02×10^{23} c) 1.20×10^{24} d) 2.41×10^{24} e) 4.82×10^{24}

$$2.00 \text{ mol N}_2\text{O}_4 \times \frac{4 \text{ mol O}}{1 \text{ mol N}_2\text{O}_4} \times \frac{6.022 \times 10^{23} \text{ O atoms}}{1 \text{ mol O}} = \mathbf{4.82 \times 10^{24} \text{ O atoms}}$$

OR

$$2.00 \text{ mol N}_2\text{O}_4 \times \frac{6.022 \times 10^{23} \text{ N}_2\text{O}_4 \text{ molecules}}{1 \text{ mol N}_2\text{O}_4} \times \frac{4 \text{ O atoms}}{1 \text{ molecule N}_2\text{O}_4} = \mathbf{4.82 \times 10^{24} \text{ O atoms}}$$

5. Balance the following equations. **Similar to a homework problem.** [4 pts]



6. A compound has an empirical formula of CH₂. Its molar mass is 84 g/mol. What is the **molecular formula** of the compound? [3 pts]

empirical mass = 14 g

$$\frac{\text{molar mass}}{\text{empirical mass}} = \frac{84 \text{ g}}{14 \text{ g}} = 6$$

The molecular formula is (CH₂)₆ or **C₆H₁₂**.

7. A compound containing C, H, and O is 54.53% C and 9.15% H by mass. The remainder is O. Determine the **empirical formula** of this compound. **Similar to a homework problem.** [5 pts]

Assume 100g.

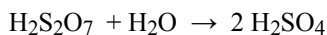
$$54.53 \text{ g C} \times \frac{1 \text{ mol C}}{12.01 \text{ g C}} = 4.54 \text{ mol C}$$

$$9.15 \text{ g H} \times \frac{1 \text{ mol H}}{1.008 \text{ g H}} = 9.08 \text{ mol H}$$

$$36.32 \text{ g O} \times \frac{1 \text{ mol O}}{16.00 \text{ g O}} = 2.27 \text{ mol O}$$

This gives the formula, C_{4.54}H_{9.08}O_{2.27}. Dividing by the smallest number of moles (2.27 moles) gives the empirical formula, **C₂H₄O**.

8. How many **grams** of H₂S₂O₇ are required to react with 3.67 grams of H₂O? **Homework Problem** [5 pts]



$$3.67 \text{ g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18.02 \text{ g H}_2\text{O}} \times \frac{1 \text{ mol H}_2\text{S}_2\text{O}_7}{1 \text{ mol H}_2\text{O}} \times \frac{178.16 \text{ g H}_2\text{S}_2\text{O}_7}{1 \text{ mol H}_2\text{S}_2\text{O}_7} = \mathbf{36.3 \text{ g H}_2\text{S}_2\text{O}_7}$$

1 mole = 6.022 × 10²³ particles

Molar mass C = 12.01 g/mol

Molar mass Ti = 47.88 g/mol

Molar mass S = 32.07 g/mol

Molar mass O = 16.00 g/mol

Molar mass N = 14.01 g/mol

Molar mass H = 1.008 g/mol