

Name: _____

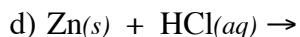
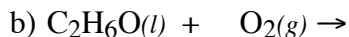
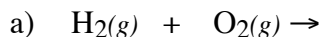
Honors Chem: Types of Chemical Reactions

1. Explain how the process of balancing a chemical equation is necessary to satisfy the law of conservation of mass.
2. Where do integral (whole) numbers appear in balanced chemical equations?
3. Which numbers can be changed to balance the equation?
4. In the following chemical equation



- (i) What does the number 3 indicate in $3\text{CO}_2(g)$? What does the number 2 indicate? What does (g) mean?
 - (ii) Identify the phase specified for each reactant and product.
 - (iii) Is the equation balanced? If not, write the balanced equation.
5. Write a chemical equation illustrating each of the following reaction types. In each case, what are the important characteristics that could help you recognize other chemical equations as belonging to that particular category?
- a) synthesis reaction
 - b) combustion reaction
 - c) decomposition reaction
 - d) single replacement reaction
 - e) double replacement reaction
 - f) neutralization reaction

6. Practice predicting the products of chemical reactions.



7. Define relative atomic mass unit (amu). What is the relationship between amu and the mass of a single atom expressed in grams?
8. Describe how the formula mass of a compound is calculated.
9. Define the terms *mole* and *Avogadro's number*. How are these two quantities related?
10. Write a general mathematical equation that relates the number of moles of a compound to the molar mass of that compound.

Complete the following table

Formula	M , Molar Mass $\left(\frac{\text{g}}{\text{mol}}\right)$	m , Mass of sample (g)	n , Moles of sample (mol)	N , Number of atoms, molecules, or formula units
H ₂ SO ₄	98.0	0.825		
Cr ₂ O ₃				9.63 x 10 ²³
unknown		56.8	0.476	
Mo			62.8	

11. Briefly describe what information is contained in the formula of a compound. What initial information must be available to determine the empirical formula for a compound?
- 12a. Elemental analysis of nicotine reports 2.13 g carbon, 0.248 g hydrogen and 0.493 g nitrogen. Determine the simplest (empirical) formula for nicotine.
- 12b. A 0.00300 g sample of naphthalene, a compound containing only carbon and hydrogen, was burned in excess oxygen to give 0.0103 g of CO₂. Determine the empirical formula of naphthalene. The formula weight of naphthalene is 128 u, determine the molecular formula.
13. Determine the number of moles in each of the following.
- 25.6 g of acetic acid (HC₂H₃O₂)
 - 1.89 x 10⁻⁴ g of Ca₃(PO₄)₂
14. Determine the number of oxygen atoms in each of the following.
- 6.451 moles of C₆H₈O₆ (vitamin C)
 - 1.89 x 10⁻⁴ g of Ca₃(PO₄)₂

15. Determine the mass in grams in each of the following.

a) 0.0721 moles of H_3PO_4 (phosphoric acid)

b) 72 atoms of sulfur

16. Determine the percent composition of each element in $\text{Ni}_3(\text{PO}_4)_2$.

17. Determine the empirical formula for a compound which is 26.6 % potassium, 35.4 % chromium and 38.1 % oxygen.

18. When a solid compound which is 27.62 % Ca, 22.06 % S, 49.62 % O and 0.700 % H is heated, a solid product is isolated which is 29.45 % Ca, 23.52 % S and 47.03 % O. What is the other product formed? Write the chemical equation which describes the reaction which has occurred.