

### Lesson 3: Chemical Formulas

text: 42-49

what to know:

- difference between molecules and compounds, molecular formulas and formula units, empirical formulas and molecular formulas, §2-1
- how to determine per cent composition from formulas and empirical formulas from per cent composition or combining masses, §2-2

questions:

- 1.What is the % Al in aluminum oxide?
- 2.How many g of Ca(40) are in 26.0 g of calcium hydroxide?
- 3.Verify the following data for the compound  $\text{Al}_2(\text{HPO}_4)_3$  (342 g/mole).

Element	Moles per mole compound	Grams per mole compound	Grams per 1.00 g compound	Moles per 1.00 g compound	Moles per one mole Al	Empirical formula
Al	2	54	0.16	0.0059	1.0	2
H	3	3	0.0088	0.0088	1.5	3
P	3	93	0.27	0.0088	1.5	3
O	12	192	0.56	0.035	6.0	12

- 4.Ethylene glycol, commonly used as an antifreeze, has the empirical formula,  $\text{CH}_3\text{O}$ . Its molar mass is around 60. What is its molecular formula?
- 5.A 50.0 g sample contains 20.0 g of calcium, 6.00 g of carbon, and oxygen. What is the empirical formula for the compound?
- 6.If 0.983 g of a compound composed of phosphorus and sulfur contains 0.386 g of phosphorus, what is the simplest formula for the compound? (atomic weights, P = 31.0, S = 32.0)
- 7.A certain metal oxide has a formula,  $\text{MO}_2$ . A 39.46 g sample of the compound is heated in an atmosphere of hydrogen to remove the oxygen as water molecules. At the end, 24.94 g of the metal M is left over. If oxygen has an atomic mass of 16.00 amu, calculate the atomic mass of metal M and identify the element.
- 8.Suppose you were buying fertilizer and found that the cost of urea,  $(\text{NH}_2)_2\text{CO}$ , and ammonium nitrate,  $\text{NH}_4\text{NO}_3$ , were the same cost per ton. Show that you be getting the most nitrogen for your \$ with the urea.
9. Additional practice problems: #s 5,27,29 pages 66,67