

# Empirical / Molecular Formulas

16. Calculate the empirical formula for compounds with the following compositions.
- Fe 63.5%, S 36.5%
  - Mn 63.1%, S 36.9%
  - K 26.6%, Cr 35.4%, O 38.0%
17. Calculate empirical formulas for the following two compounds containing sodium, sulfur, and oxygen.
- Na 32.4%, S 22.6%, O 45.0%
  - Na 29.1%, S 40.5%, O 30.4%
18. Calculate the empirical formulas for the following three iron ores.
- Fe 77.7%, O 22.3%
  - Fe 72.4%, O 27.6%
  - Fe 70.0%, O 30.0%

19. There are two oxides of phosphorus. Both oxides can exist in different forms depending on the temperature and the pressure. Calculate the empirical and molecular formulas from the following data.
- P 56.4%, O 43.7%, molecular mass 220
  - P 43.6%, O 56.4%, molecular mass 284
20. The formula mass of a compound is 92. Analysis of the compound shows that there are 0.608 g of nitrogen and 1.388 g of oxygen. What is the molecular formula of this compound?

## Hydrates

21. The masses of the hydrates listed below were measured, heated to drive off the water of hydration, and cooled. Then the masses of the residues were measured. Find the formulas of the following hydrates.
- 1.62 g of  $\text{CoCl}_2 \cdot x\text{H}_2\text{O}$  gave a residue of 0.88 g
  - 1.21 g of  $\text{Pb}(\text{CH}_3\text{COO})_2 \cdot x\text{H}_2\text{O}$  gave a residue of 1.03 g
  - 1.04 g  $\text{NiSO}_4 \cdot x\text{H}_2\text{O}$  gave a residue of 0.61 g
  - 1.26 g of  $\text{CaSO}_4 \cdot x\text{H}_2\text{O}$  gave a residue of 0.99 g
22. A hydrated magnesium compound has a formula mass of about 174 and contains 31.0% water of hydration. From the following analysis, calculate the molecular formula: Mg 13.90%, P 17.74%, H 4.01%, O 64.30%.