

M4 Practice Test

Empirical and molecular formulas:

Nicotine (molar mass 162.23 g/mol), an alkaloid in the nightshade family of plants that is mainly responsible for the addictive nature of cigarettes, contains 74.02% C, 8.710% H, and 17.27% N.

Determine the empirical and molecular formula for nicotine.

Determine the empirical and molecular formula for chrysotile asbestos. Chrysotile has the following percent composition: 28.03% Mg, 21.60% Si, 1.16% H, and 49.21% O. The molar mass for chrysotile is 520.8 g/mol.

A major textile dye manufacturer developed a new yellow dye. The dye has a percent composition of 75.95% C, 17.72% N, and 6.33% H by mass with a molar mass of about 240 g/mol. Determine the molecular formula of the dye.

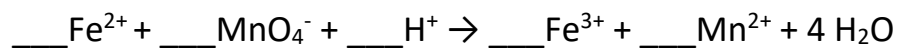
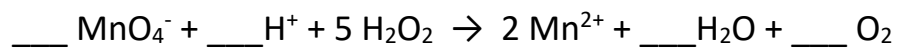
Combustion Analysis:

Quinone, which is used in the dye industry and in photography, is an organic compound containing only C, H, and O. A 0.105g sample of the compound gives 0.257g of CO_2 and 0.0350g of H_2O when combusted; determine the empirical and molecular formula (molar mass 108g/mol).

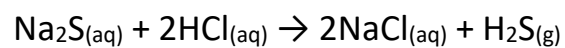
A carbohydrate is a compound composed solely of carbon, hydrogen and oxygen. When 10.7695g of an unknown carbohydrate (Molar mass 128.2080 g/mol) was subjected to combustion analysis with excess oxygen, it produced 29.5747g CO_2 and 12.1068g H_2O . What is its molecular formula?

Ionic Equations:

Balance the following ionic equations:

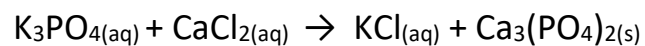


Determine the total and net ionic equations:



Total:

Net:

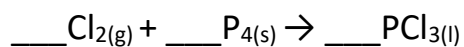


Total:

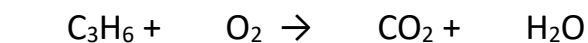
Net:

Calculations from balanced equations:

85.4g of chlorine gas (Cl_2 molar mass 70.9g/mol) reacts with excess P_4 to produce 104g of PCl_3 (molar mass 137.3g/mol). Determine the percentage yield.



If the reaction of 91.3g of C_3H_6 (42.08g/mol) produces an 81.3% yield, how many grams of CO_2 (molar mass 44.01g/mol) would be produced?



If the reaction of 77.0g of $\text{Ca}(\text{CN})_2$ produces 27.1 grams of NH_3 , what is the percentage yield?

$\text{Ca}(\text{CN})_2$ molar mass: 92.11g/mol

NH_3 molar mass: 17.03g/mol

