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CHEMISTRY & MATERIALS SCIENCE

Contents

Introduction

Stoichiometry

All stoichiometric equations for quantities may be derived from

$$\frac{n_1}{v_1} = \frac{n_2}{v_2} \tag{1}$$

moles	$n = m/M = CV$
atoms	$n_{\text{atoms}} = \rho V N_a / M$
molarity	$C = mn/MV$
dilution	$n_1 = n_2$

Figure 1: Equations for quantities derived from Equation 1.

The percentage yield is defined as

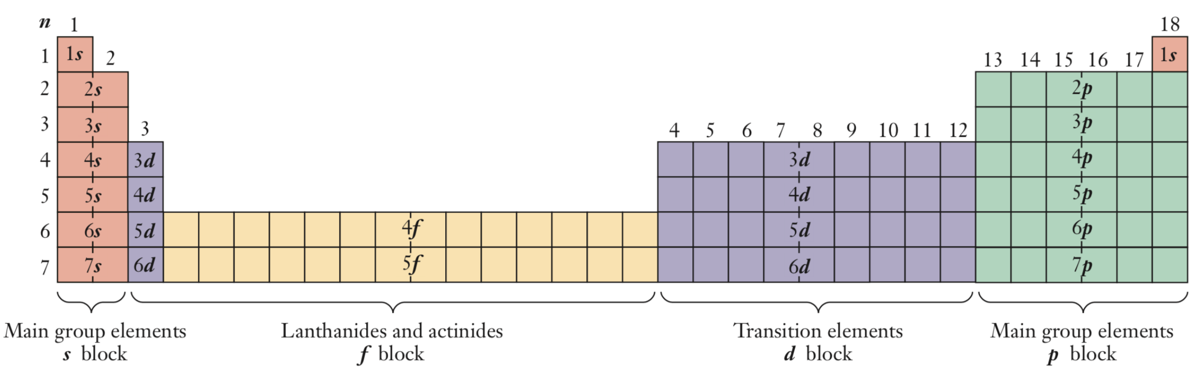
$$\%\ \text{yield} = \frac{\text{actual yield}}{\text{theo. yield}} \times 100\% \tag{2}$$

A crucial aspect in confirming stoichiometric results is using dimensional analysis; that is, using the dimensions of each unit in the equation(s) and confirming the final unit has the proper dimensions.

Bonding

The total number of orbitals is equal to n^2, where n is the principle quantum number, wherein each orbital has a maximum of two electrons. This maximum occurs only if all subshells contain one electron originally, known as Hund's rule. The orbitals filling order is

$$1s^2\, 2s^2\, 2p^6\, 3s^2\, 3p^6\, 4s^2\, 3d^{10}\, 4p^6\, 5s^2 \ldots \tag{3}$$



The formal charge is given by $q_f = n_v - n_l - \frac{1}{2} n_s$ in which $\sum q_f = 0$. Hybrid orbitals are dependent