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$$\Delta H_r^\circ = \sum \Delta H_{B(\text{reactants})} - \sum \Delta H_{B(\text{products})}$$

$$\Delta H_r^\circ = \sum \Delta H_f^\circ (\text{products}) - \sum \Delta H_f^\circ (\text{reactants})$$

$$\Delta S_r^\circ = \sum S^\circ (\text{products}) - \sum S^\circ (\text{reactants})$$

$$\Delta G_r^\circ = \sum \Delta G_f^\circ (\text{products}) - \sum \Delta G_f^\circ (\text{reactants})$$

$$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$$

$$\Delta G^\circ = -RT \ln K$$

$$\Delta G = \Delta G^\circ + RT \ln Q$$

$$\Delta G = RT \ln (Q/K)$$

$$\ln (K_2/K_1) = -(\Delta H^\circ/R)(1/T_2 - 1/T_1)$$

$$PV = nRT$$

$$R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$$

$$R = 0.08206 \text{ L atm K}^{-1} \text{ mol}^{-1}$$

$$x = [-b \pm (b^2 - 4ac)^{1/2}] / 2a$$

$$s = k_H P$$

$$14.00 = \text{pH} + \text{pOH} \text{ at } 25^\circ\text{C}$$

$$\text{pOH} = -\log [\text{OH}^-]$$

$$\text{pH} = -\log [\text{H}_3\text{O}^+]$$

$$K_w = K_a K_b$$

$$K_w = 1.00 \times 10^{-14} \text{ at } 25^\circ\text{C}$$

$$\text{pK}_a = -\log [K_a]$$

$$\text{pK}_b = -\log [K_b]$$

$$\text{pH} \approx \text{pK}_a - \log ([\text{HA}]/[\text{A}^-])$$

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5.111 Principles of Chemical Science  
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