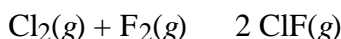


Chemistry 236 -- Practice Quiz 6
October 15, 2003 — Spectrophotometric Determination of K

1. Our treatment of the stoichiometry for the $I_2 + M \rightleftharpoons I_2 \cdot M$ reaction yielded a straight-line relationship permitting us to extract K and x from an appropriate plot of "y" vs. "x." If this expression is written as $y = a + bx$, the equilibrium constant K is given by

a. a/b b. b/a c. $a \times b$ d. $1/a$ e. none of these

2. For the following reaction, $K = 8.6 \times 10^{19}$ at 25°C and $K = 1.09 \times 10^{15}$ at 125°C :



Assuming that H° and S° are independent of T over this range, calculate S° .

a. $3.7 \text{ J K}^{-1} \text{ mol}^{-1}$ b. $8.5 \text{ J K}^{-1} \text{ mol}^{-1}$ c. $11.3 \text{ J K}^{-1} \text{ mol}^{-1}$
d. $-111.2 \text{ J K}^{-1} \text{ mol}^{-1}$ e. $-113.7 \text{ J K}^{-1} \text{ mol}^{-1}$

3. The reaction $A + B \rightleftharpoons C$ is studied experimentally by mixing together solutions of A and B and determining concentrations at equilibrium. 10.0 mL of 0.036 M A is mixed with 5.0 mL of 0.126 M B, and at equilibrium $[C]$ is found to be 0.0094 M. What is the value of K for this reaction?

a. 2.1 L mol^{-1} b. 3.0 L mol^{-1} c. 9.3 L mol^{-1} d. 19.7 L mol^{-1} e. none of these

4. In the preceding reaction, A and B are both monitored spectrophotometrically. B alone absorbs at 600 nm, with $\epsilon_{B,600} = 550 \text{ L mol}^{-1} \text{ cm}^{-1}$, while both A and B absorb at 400 nm, with $\epsilon_{A,400} = 800 \text{ L mol}^{-1} \text{ cm}^{-1}$ and $\epsilon_{B,400} = 270 \text{ L mol}^{-1} \text{ cm}^{-1}$. C has negligible absorption at both wavelengths. A reaction mix yields $A_{600} = 0.89$ and $A_{400} = 1.03$ for a 1.00-cm path length. If the initial concentration of A was $[A]_0 = 1.00 \times 10^{-3} \text{ M}$, what is K for the reaction?