

A First Course on Kinetics and Reaction Engineering

Unit 3 Pre-Class Quiz

1. True or False? The name equilibrium “constant” is technically inaccurate because the equilibrium constant actually varies with temperature; it is not constant.
2. True or False? The equation below can be used to calculate the equilibrium constant for “reaction 1” at 400 K by substituting 400 K in place of T .

$$K_1 = \exp \left\{ \frac{-\Delta G_1^0 (298 \text{ K})}{RT} \right\}$$

3. Which of the following equations is used to calculate the equilibrium composition of a reacting ideal gas mixture?

a.
$$K_j(T) = \prod_{\substack{i=\text{all} \\ \text{species}}} \left(\frac{y_i P}{1 \text{ atm}} \right)^{v_{i,j}}$$

b.
$$K_j(T) = \prod_{\substack{i=\text{all} \\ \text{species}}} \left(\frac{h_i P}{1 \text{ atm}} \right)^{v_{i,j}}$$

c.
$$K_j(T) = \prod_{\substack{i=\text{all} \\ \text{species}}} (h_i x_i)^{v_{i,j}}$$

d.
$$K_j(T) = \prod_{\substack{i=\text{all} \\ \text{species}}} (\gamma_i h_i)^{v_{i,j}}$$

e.
$$K_j(T) = \prod_{\substack{i=\text{all} \\ \text{species}}} (\gamma_i x_i)^{v_{i,j}}$$

4. An irreversible reaction is one that
 - a. reaches thermodynamic equilibrium long before it has gone to completion
 - b. occurs at high pressure and low temperature where the ideal gas law does not apply
 - c. has an extremely large equilibrium constant
 - d. causes an inversion in the activity coefficient
 - e. involves a non-ideal solution
5. In general, the equilibrium constant for a reaction
 - a. will be larger for solutions of high concentration
 - b. remains the same if the pressure changes
 - c. is large for fast reactions
 - d. cannot be computed if the reaction is endothermic
 - e. has virtually no usefulness