A First Course on Kinetics and Reaction Engineering

Unit 5 Pre-Class Quiz

1. True or False? The exponents, m_i, in a power-law expression like that shown below must equal the stoichiometric coefficients of the corresponding species in the balanced equation for the reaction.

$$r = k \prod_{\substack{\text{some or all} \\ \text{species, i}}} \left[i \right]^{m_i}$$

2. True or False? If any rate expression is multiplied by the term below, the resulting rate expression will display the proper behavior as the system approaches equilibrium.

$$\left\{ 1 - \frac{\prod_{\substack{i=\text{all} \\ \text{species}}} \left[i \right]^{\nu_{i,j}}}{K_{eq,j}} \right\}^{a}$$

3. True or False? The stoichiometric coefficients appearing in an elementary reaction must always be integers.
4. Which of the following is NOT an assumption used in the collision theory?
   a. Molecules are treated as point masses that have a collision radius.
   b. Molecular energies are distributed according to the Boltzmann distribution.
   c. All collisions between reactant molecules lead to reaction.
   d. There are no attractive or repulsive forces between molecules.
   e. Collisions are perfectly elastic.
5. Which of the following is NOT an assumption used in the transition state theory?
   a. Reacting species follow the pathway from reactants to products that has the smallest potential energy barrier
   b. Reactants are in equilibrium with “forward-moving” activated complexes.
   c. The equilibrium between reactants and “forward-moving” activated complexes can be described using conventional thermodynamics.
   d. Some of the reactants “tunnel” through the activation barrier instead of passing over it.
   e. Movement across the reaction barrier corresponds to one of the degrees of freedom of the activated complex.