

Review problems

chapter 12: 1, 2, 3, 4, 7, 8, 9, 10, 12, 13, 18, 23, 25, 32, 45, 46

chapter 13: 1, 5, 10, 11, 12, 18, 33, 34, 38, 39, 40

12.1 A reaction goes to completion if at least one of the reactants is entirely converted into products - as happens to a limiting reactant when the equilibrium constant is very large.

12.2 A reaction "ends" as soon as it reaches a state of dynamic equilibrium whereby reactants are converted into products at the same rate that products are reconverted back into reactants. So, it looks like nothing changes, microscopically the forward and reverse reactions are occurring at the same rate.

12.3 Chemical equilibrium is dynamic because opposing processes occur at the same rate. The system is always susceptible to external manipulation.

12.4 No, we cannot compute the concentrations. We also need to know the initial concentrations. We do know, however, if the reaction will tend towards products ($K > 1$) or reactants ($K < 1$).

12.7 (d) only.

12.8 (a) $K < 1$ (more reactants) (c) $K = 1$ (more products)

(b) $K > 1$ (more products) (d) $K = 1$ (more reactants)

12.9 (a) $K > 1$ (more products) (c) $K = 1$ (more products)

(b) $K < 1$ (more reactants) (d) $K = 1$ (more reactants)