CHEM 101
Timberlake 2e
Chapter 9, Part b Answer Key
Problems: 13, 15, 26, 50, 60, EC-56
15 points

9.13  a. only one state (gases) is present; homogeneous
b. solid and gaseous states; heterogeneous
c. only one state (gases) is present; homogeneous
d. gas and liquid states; heterogeneous

9.15  a. \(K_c = \frac{[O_2]^3}{[O_3]^2}\)  b. \(K_c = [CO_2][H_2]O\)
c. \(K_c = \frac{[CO][H_2]^3}{[H_2]O}[CH_4]\)  d. \(K_c = \frac{[Cl_2]^2}{[HCl]4[O_2]}\)

9.26 \(K_c = \frac{[NH_3]^2}{[H_2]^2[N_2]}\)

Rearrange \(K_c\) to solve for \([H_2]\) and substitute concentrations to calculate \([H_2]\).

\([N_2] = \frac{[H_2]1^2}{K_c[H_2]^3} = \frac{[0.14]^2}{1.7 \times 10^{-2}[0.18]^3} = 2.0 \times 10^{-2} \text{ M}\)

9.50  a. Adding a product shifts equilibrium to reactants.
b. Adding a reactant shifts equilibrium to products.
c. Adding a product shifts equilibrium to reactants.
d. Adding a product shifts equilibrium to reactants.

9.60  a. decrease CO
b. increase CO
c. increase CO
d. no change in CO
e. decrease CO
f. no change in CO
g. decrease CO
h. decrease CO

EC

9.56  a. \(\frac{[NO]^2[Br_2]}{[NOBr]^2} = \frac{[0.10 \text{ M}]^2[0.10 \text{ M}]}{[0.10 \text{ M}]^2} = 0.10\), which is not equal to \(K_c\) (2.0).
b. Since 0.10 is less than \(K_c\), the new equilibrium mixture must have more NO and Br\(_2\) and less NOBr; the reaction will proceed in the forward direction.