

**Table 3-1 Relationship Between the Standard Free-Energy Change,  $\Delta G^\circ$ , and Equilibrium Constant**

EQUILIBRIUM CONSTANT $\frac{[X]}{[Y]} = K$	FREE ENERGY OF X MINUS FREE ENERGY OF Y (kcal/mole)
$10^5$	-7.1 (-29.7)
$10^4$	-5.7 (-23.8)
$10^3$	-4.3 (-18.0)
$10^2$	-2.8 (-11.7)
10	-1.4 (-5.9)
1	0 (0)
$10^{-1}$	1.4 (5.9)
$10^{-2}$	2.8 (11.7)
$10^{-3}$	4.3 (18.0)
$10^{-4}$	5.7 (23.8)
$10^{-5}$	7.1 (29.7)

Values of the equilibrium constant were calculated for the simple chemical reaction  $Y \rightleftharpoons X$  using the equation given in the text.

The  $\Delta G^\circ$  given here is in kilocalories per mole at 37°C, with kilojoules per mole in parentheses (1 kilocalorie is equal to 4.184 kilojoules). As explained in the text,  $\Delta G^\circ$  represents the free-energy difference under standard conditions (where all components are present at a concentration of 1.0 mole/liter).

From this table, we see that if there is a favorable free-energy change of -4.3 kcal/mole (-18.0 kJ/mole) for the transition  $Y \rightarrow X$ , there will be 1000 times more molecules in state X than in state Y.