

Skill Practice 47

Quotient Practice

Name: _____

Date: _____

Hour: _____

1. The following reaction has an equilibrium constant K_c equal to 3.07×10^{-4} . At a given moment in time, the concentration of NOBr was 0.181 M, the concentration of NO was 0.0123 M and the concentration of Br₂ was 0.0201 M. Is the reaction at equilibrium? If not, indicate whether more products or more reactants will be formed. $2\text{NOBr (g)} \leftrightarrow 2\text{NO (g)} + \text{Br}_2 \text{(g)}$

The reaction is not at equilibrium. Since $Q = 9.28 \times 10^{-5}$ it is smaller than K_c meaning that more products will be formed.

2. Consider the reaction $2\text{H}_2\text{S (g)} + 3\text{O}_2 \text{(g)} \leftrightarrow 2\text{H}_2\text{O (g)} + 2\text{SO}_2 \text{(g)}$ where $K_c = 2.38$. The reaction began and after a while, the sample was analyzed and the concentration of SO₂ was 0.085 M, the concentration of H₂O was 0.071 M, the concentration of O₂ was 0.162M and the concentration of H₂S was 0.059 M. As the reaction proceeds from this moment forward, do you expect more products to form or more reactants? Explain.

The reaction is not at equilibrium. Since $Q = 2.46$ it is larger than K_c which means that more reactants will be formed.

3. Given the reaction: $\text{H}_2 + \text{I}_2 \leftrightarrow 2\text{HI}$. The equilibrium constant K_c is 0.481. The concentrations of H₂, I₂, and HI were measured at various times. For each of the following sets of data indicate whether the reaction is at equilibrium or not. If the reaction is not at equilibrium, then indicate whether more reactants will form or whether more products need to form to attain equilibrium.

a) $[\text{H}_2] = 0.27 \text{ M}$; $[\text{I}_2] = 0.40 \text{ M}$; $[\text{HI}] = 0.31 \text{ M}$

$Q = 0.890$ so more reactants will form.

b) $[\text{H}_2] = 0.46 \text{ M}$; $[\text{I}_2] = 0.34 \text{ M}$; $[\text{HI}] = 0.28 \text{ M}$

$Q = 0.501$ so more reactants will form.

c) $[\text{H}_2] = 0.18 \text{ M}$; $[\text{I}_2] = 0.29 \text{ M}$; $[\text{HI}] = 0.48 \text{ M}$

$Q = 4.41$ so more reactants will form.

d) $[\text{H}_2] = 0.257 \text{ M}$; $[\text{I}_2] = 0.269 \text{ M}$; $[\text{HI}] = 0.510 \text{ M}$

$Q = 3.76$ so more reactants will form.