Quiz: Gaseous Equilibrium

Name:_____

1. Given the reaction: $2NOBr(g) \leftrightarrow 2NO(g) + Br_2(g)$

   a. Write the formula of the equilibrium constant expression (Kc) for the reaction above.

$$K_c = \frac{[Br_2][NO]^2}{[NOBr]^2}$$

   b. Analysis shows that when the given system reaches equilibrium at 500K, the concentration of NOBr gas is 0.515M, NO gas is 0.350M, and Br_2 gas is 1.00M. Calculate the value of Kc at 500K.

$K_c = .462$

   c. If a 2.0L flask contains 0.34 moles of NOBr, 1.25 moles of NO, and 0.95 moles of Br_2 at 500K. Is the mixture at equilibrium? Show work to justify your answer.

$Q = 6.42 \qquad K_c = .462$

$Q > K_c$

∴ NOT at Equilibrium since $Q \neq K_c$

   d. Will the reaction shift forward, reverse, or not at all to establish equilibrium?

SHIFT REVERSE

2. Given the reaction : $SO_2(g) + NO_2(g) \leftrightarrow NO(g) + SO_3(g)$

At 700K, the reaction has a Kc = 3.6. Initially 4.00 moles of SO_2 gas and 4.00 moles of NO_2 gas are placed into a 2.0L flask and allowed to react.

a. Calculate equilibrium concentrations for all four gases.

$[SO_2] = [NO_2] = .70\ M$

$[SO_3] = [NO] = 1.3\ M$

b. Once equilibrium is established at 700K, predict what kind of shift will occur for each of the following disturbances.

i. Adding SO_2 gas FORWARD (Right) Shift

ii. Removing NO gas FORWARD (Right) Shift

iii. Increasing volume NO SHIFT