Quiz Two Name_____

Version #2

1. Hydrogen iodide, HI, is formed in an equilibrium reaction when gaseous hydrogen and iodine gas are heated together. If 20.0 g of hydrogen and 20.0 g of iodine are heated, forming 10.0 g of hydrogen iodide, what mass of hydrogen remains unreacted?

A. Need to know the equilibrium constant in order to calculate the answer.

B. 15.0 g hydrogen remains

C. 19.9 g hydrogen remains

D. 10.9 g hydrogen remains

E. 10.0 g hydrogen remains

2. Compounds A, B, and C react according to the following equation.

$3A(g) + 2B(g) \rightleftharpoons 2C(g)$

At 100°C a mixture of these gases at equilibrium showed that [A] = 0.855 M, [B] = 1.23 M, and [C] = 1.75 M. What is the value of K_c for this reaction?

A. 0.601 B. 1.66 C. > 10 D. 0.309 E. 3.24

3. A mixture of 0.500 mole of carbon monoxide and 0.400 mole of bromine was placed into a rigid 1.00-L container and the system was allowed to come to equilibrium. The equilibrium concentration of $COBr_2$ was 0.233 M. What is the value of K_c for this reaction?

$CO(g) + Br_2(g) \rightleftharpoons COBr_2(g)$

A. 5.23 B. 0.191 C. 1.22 D. 0.858 E. 1.165

4. Nitric oxide and bromine were allowed to react in a sealed container. When equilibrium was reached P_{NO} = 0.526 atm, P_{Br_2} = 1.59 atm, and P_{NOBr} = 7.68 atm. Calculate K_p for the reaction.

$2NO(g) + Br_2(g) \rightleftharpoons 2NOBr(g)$

A. 134 B. 7.45×10^{-3} C. 0.109 D. 9.18 E. 91.8

5. At 850°C, the equilibrium constant K_p for the reaction $C(s) + CO_2(g) \rightleftharpoons 2CO(g)$ has a value of 10.7. If the total pressure in the system at equilibrium is 1.000 atm, what is the partial pressure of carbon monoxide?

A. 0.915 atm B. 0.489 atm C. 0.362 atm D. 0.667 atm E. 0.921 atm

6. The following reaction is at equilibrium at a pressure of 1 atm, in a closed container.

$NaOH(s) + CO_2(g) \rightleftharpoons NaHCO_3(s)$ $\Delta H°_{rxn} < 0$

Which, if any, of the following actions will decrease the concentration of CO_2 gas present at equilibrium?

A. adding more solid NaOH

B. None of these choices is correct.

C. increasing the volume of the container

D. lowering the temperature

E. adding N_2 gas to double the pressure

7. Consider the following two equilibria and their respective equilibrium constants:

(1) $NO(g) + \frac{1}{2}O_2(g) \rightleftharpoons NO_2(g)$

(2) $2NO_2(g) \rightleftharpoons 2NO(g) + O_2(g)$

Which one of the following is the correct relationship between the equilibrium constants K_1 and K_2?

A. $K_2 = 2/K_1$ B. $K_2 = -K_1/2$ C. $K_2 = 1/(2K_1)$ D. $K_2 = (1/K_1)^2$ E. $K_2 = 1/(2K_1)^2$

8. When 0.152 mol of solid PH_3BCl_3 is introduced into a 3.0 L container at a certain temperature, 8.44×10^{-3} mol of PH_3 is present at equilibrium:

$PH_3BCl_3(s) \rightleftharpoons PH_3(g) + BCl_3(g)$

Construct a reaction table for the process, and use it to calculate K_c at this temperature.

9. The Haber process for ammonia synthesis is exothermic:

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$, $\Delta H° = -92$ kJ

If the equilibrium constant K_c for this process at 500.°C is 6.0×10^{-2}, what is its value at 300.°C?

10. Consider the equilibrium:

$A(s) \rightleftharpoons B(s) + C(g)$, $\Delta H°_{rxn} > 0$

Predict and explain how or whether the following actions would affect this equilibrium.

a. adding more solid A

b. lowering the temperature

c. increasing the pressure on the system by reducing its volume

d. adding helium gas to increase the total pressure