

This print-out should have 8 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. V1:1, V2:1, V3:1, V4:1, V5:2.

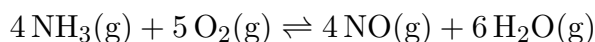
You will have 20 minutes for the quiz. Please make sure you write your version numbers on your scantron. Good luck!

Mlib 07 1133

21:02, general, multiple choice, > 1 min, fixed.

001 (part 1 of 1) 5 points

What would be the expression for K_c for the reaction



at equilibrium?

1. $[\text{NO}]^4 [\text{H}_2\text{O}]^6$
2. $[\text{NH}_3]^4 [\text{O}_2]^5$
3. $\frac{[\text{NO}]^4 [\text{H}_2\text{O}]^6}{[\text{NH}_3]^4 [\text{O}_2]^5}$ **correct**
4. $\frac{[\text{NH}_3]^4 [\text{O}_2]^5}{[\text{NO}]^4 [\text{H}_2\text{O}]^6}$
5. $\frac{[\text{NO}]^4 [\text{H}_2\text{O}]}{[\text{NH}_3]^4}$

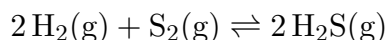
Explanation:

Msci 17 0514

21:11, general, multiple choice, > 1 min, fixed.

002 (part 1 of 1) 5 points

$K_c = 2.6 \times 10^8$ at 825 K for the reaction



The equilibrium concentration of H_2 is 0.0020 M and that of S_2 is 0.0010 M. What is the equilibrium concentration of H_2S ?

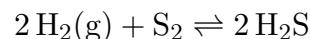
1. 10 M
2. 1.02 M **correct**
3. 0.10 M
4. 0.0010 M

Explanation:

$$K_c = 2.6 \times 10^8$$

$$[\text{H}_2]_{\text{eq}} = 0.0020 \text{ M}$$

$$[\text{S}_2]_{\text{eq}} = 0.0010 \text{ M}$$



$$K_c = \frac{[\text{H}_2\text{S}]^2}{[\text{H}_2]^2 [\text{S}_2]}$$

$$[\text{H}_2\text{S}] = \sqrt{K_c [\text{H}_2]^2 [\text{S}_2]}$$

$$= \sqrt{(2.6 \times 10^8) (0.0020 \text{ M})^2 (0.0010 \text{ M})}$$

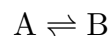
$$= 1.0 \text{ M}$$

Msci 17 0503

21:11, general, multiple choice, > 1 min, fixed.

003 (part 1 of 1) 5 points

Suppose the reaction



has an equilibrium constant of 1.0 and the initial concentrations of A and B are 0.5 M and 0.0 M, respectively. Which of the following is the correct value for the final concentration of A?

1. 0.500 M
2. 0.250 M **correct**
3. 1.00 M
4. 1.50 M
5. None of these is correct.

Explanation:

$$K = 1.0$$

$$[\text{A}]_{\text{ini}} = 0.5 \text{ M}$$

$$[\text{B}]_{\text{ini}} = 0 \text{ M}$$

	A	\rightleftharpoons	B
ini, M	0.5		0.0
Δ , M	$-x$		x
eq, M	$0.5 - x$		x

$$K = \frac{[\text{B}]}{[\text{A}]} = 1.0$$

$$\frac{x}{0.5 - x} = 1.0$$

$$x = 0.25 \text{ M}$$

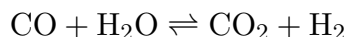
$$[A] = 0.5 - x = 0.25 \text{ M}$$

Msci 17 0509

21:11, general, multiple choice, > 1 min, fixed.

004 (part 1 of 1) 5 points

The equilibrium constant for the gaseous reaction



is 4.0 at a certain temperature. A reaction is carried out at this temperature starting with 2.0 mol/L of CO and 2.0 mol/L of H₂O. What will be the equilibrium concentration of H₂?

1. 2.0 M
2. 0.75 M
3. 1.33 M **correct**
4. 0.67 M
5. 1.5 M

Explanation:

$$K = 4.0$$

$$[\text{CO}]_{\text{ini}} = 2.0 \text{ mol/L}$$

$$[\text{H}_2\text{O}]_{\text{ini}} = 2.0 \text{ mol/L}$$

	CO	+	H ₂ O	⇌	CO ₂	+	H ₂
Ini, M	2		2		-		-
Δ, M	-x		-x		+x		+x
Final, M	2 - x		2 - x		x		x

Substitute the final concentrations into the equation for K :

$$\begin{aligned}
 K &= \frac{[\text{CO}_2][\text{H}_2]}{[\text{CO}][\text{H}_2\text{O}]} \\
 4 &= \frac{(x)(x)}{(2-x)(2-x)} \\
 4 &= \frac{x^2}{4-4x+x^2} \\
 x^2 &= 4(4-4x+x^2) \\
 &= 16-16x+4x^2 \\
 03x^2 - 16x + 16 &
 \end{aligned}$$

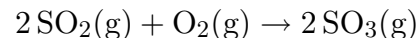
Solving the quadratic equation,

$$x = 1.33 \text{ or } x = 4$$

Since all of the ratios in the reaction are one to one, you cannot end up with a greater number of moles of H₂ than 2 mol/L, so the correct value of x must be 1.33 M.

ChemPrin3e T09 44

21:10, general, multiple choice, < 1 min, fixed.

005 (part 1 of 1) 5 pointsThe equilibrium constant K_c for the reaction

is 11.7 at 1100 K. A mixture of SO₂, O₂, and SO₃, each with a concentration of 0.015 M, was introduced into a container at 1100 K. Which of the following is true?

1. SO₂(g) and O₂(g) will be formed until equilibrium is reached. **correct**
2. [SO₃] = 0.045 M at equilibrium.
3. [SO₃] = 0.015 M at equilibrium.
4. SO₃(g) will be formed until equilibrium is reached.
5. [SO₃] = [SO₂] = [O₂] at equilibrium.

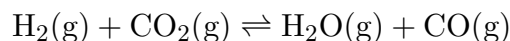
Explanation:

Mlib 06 0003

21:15, general, multiple choice, > 1 min, fixed.

006 (part 1 of 1) 5 points

For the system



at equilibrium, the addition of H₂(g) would cause (according to LeChatelier's principle)

1. only more H₂O(g) to form.
2. only more CO(g) to form.
3. more H₂O(g) and CO(g) to form. **correct**
4. only more CO₂(g) to form.

5. no change in amounts of products or reactants.

Explanation:

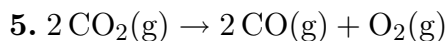
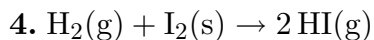
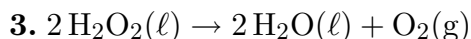
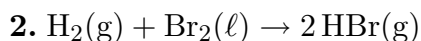
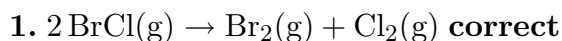
LeChatelier's Principle states that if a change in conditions occurs to a system at equilibrium, the system responds to relieve the stress and reach a new state of equilibrium. $\text{H}_2(\text{g})$ is the stress, so the reaction moves to the right to relieve the stress, forming more H_2O and CO .

ChemPrin3e T09 71

21:15, general, multiple choice, < 1 min, fixed.

007 (part 1 of 1) 5 points

Which of the following equilibrium reactions is NOT affected by changes in pressure?



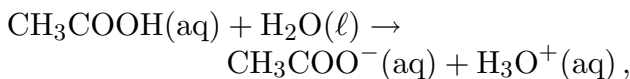
Explanation:

ChemPrin3e T09 12

21:05, general, multiple choice, < 1 min, fixed.

008 (part 1 of 1) 5 points

If $\Delta G^\circ = 27.1 \text{ kJ}$ at 25°C for the reaction



calculate K_a for this reaction at 298 K.

1. 1.15×10^{-11}

2. 5.63×10^4

3. 1.78×10^{-5} **correct**

4. 1.01

5. 9.89×10^{-1}

Explanation: