

For answers, send email to: [admin@tutor-homework.com](mailto:admin@tutor-homework.com).

**Include file name:** Chemistry\_Worksheet\_0095

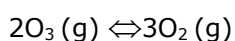
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**1. chem10b 15.2-13**

The equilibrium expression for  $K_p$  for the reaction below is \_\_\_\_\_.

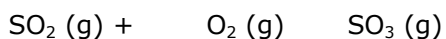


Student Response	Correct Answer
A.	
B.	
C.	
D.	
E.	

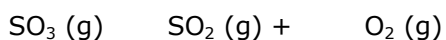
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**2. chem10b 15.2-18**

The  $K_{\text{eq}}$  for the equilibrium below is 0.112 at 700 °C.



What is the value of  $K_{\text{eq}}$  at this temperature for the following reaction?

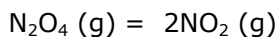


Student Response	Correct Answer
A. 0.224	
B. 0.112	
C. 0.0125	
D. 8.93	

E. -0.112

**3. chem10b 15.2-12**

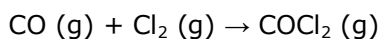
Which of the following expressions is the correct equilibrium-constant expression for the equilibrium between dinitrogen tetroxide and nitrogen dioxide?



Student Response	Correct Answer
A. $[\text{NO}_2]^2[\text{N}_2\text{O}_4]$	
B. $[\text{NO}_2][\text{N}_2\text{O}_4]$	
C.	
D. $[\text{NO}_2]^2/[\text{N}_2\text{O}_4]$	
E.	

**4. chem10b 15.5-3**

The  $K_p$  for the reaction below is  $1.49 \times 10^8$  at  $100^\circ\text{C}$ :

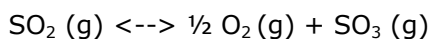


In an equilibrium mixture of the three gases,  $P_{\text{CO}} = P_{\text{Cl}_2} = 8.60 \times 10^{-4}$  atm. The partial pressure of the product, phosgene ( $\text{COCl}_2$ ), is \_\_\_\_\_ atm.

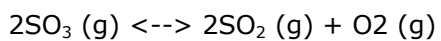
Student Response	Correct Answer
A. $2.01 \times 10^{14}$	
B. $1.28 \times 10^5$	
C. $1.10 \times 10^2$	
D. $1.72 \times 10^{11}$	
E. $4.96 \times 10^{-15}$	

**5. chem10b 15.2-19**

The  $K_{\text{eq}}$  for the equilibrium below is 0.112 at  $700^\circ\text{C}$ .



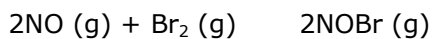
What is the value of  $K_{eq}$  at this temperature for the following reaction?



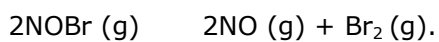
Student Response	Correct Answer
A. 2.99	
B. 4.46	
C. 79.7	
D. 8.93	
E. 17.86	

**6. chem10b 15.2-20**

At 1000 K, the equilibrium constant for the reaction



is  $K_p = 0.013$ . Calculate  $K_p$  for the reverse reaction,



Student Response	Correct Answer
A. $1.6 \times 10^{-4}$	
B. 1.1	
C. 77	
D. 0.99	
E. 0.013	

**7. chem10b 15.2-38**

The effect of a catalyst on an equilibrium is to \_\_\_\_\_.

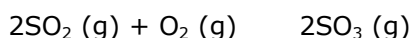
Student Response	Correct Answer
A. increase the rate at which equilibrium is achieved without changing the composition of the equilibrium mixture	
B. increase the equilibrium constant so that products are	

avored
C. increase the rate of the forward reaction only
D. slow the reverse reaction only
E. shift the equilibrium to the right

Score: 1/1

**8. chem10b 15.2-29**

The reaction below is exothermic:

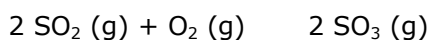


Le Chatelier's Principle predicts that \_\_\_\_\_ will result in an increase in the number of moles of  $\text{SO}_3(\text{g})$  in the reaction container.

Student Response	Correct Answer
A. removing some oxygen	
B. decreasing the pressure	
C. increasing the temperature	
D. increasing the pressure	
E. increasing the volume of the container	

**9. chem10b 15.2-21**

Consider the following equilibrium.



The equilibrium cannot be established when \_\_\_\_\_ is/are placed in a 1.0-L container.

Student Response	Correct Answer
A. 0.25 mol of $\text{SO}_2(\text{g})$ and 0.25 mol of $\text{SO}_3(\text{g})$	
B. 0.50 mol $\text{O}_2(\text{g})$ and 0.50 mol $\text{SO}_3(\text{g})$	
C. 1.0 mol $\text{SO}_3(\text{g})$	
D. 0.25 mol $\text{SO}_2(\text{g})$ and 0.25 mol $\text{O}_2(\text{g})$	
E. 0.75 mol $\text{SO}_2(\text{g})$	

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**10. chem10b 15.2-28**

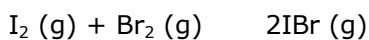
Of the following equilibria, only \_\_\_\_\_ will shift to the left in response to a decrease in volume.

Student Response	Correct Answer
A. $\text{H}_2 (\text{g}) + \text{Cl}_2 (\text{g}) \rightleftharpoons 2 \text{HCl} (\text{g})$	
B. $4 \text{Fe} (\text{s}) + 3 \text{O}_2 (\text{g}) \rightleftharpoons 2 \text{Fe}_2\text{O}_3 (\text{s})$	
C. $\text{N}_2 (\text{g}) + 3 \text{H}_2 (\text{g}) \rightleftharpoons 2 \text{NH}_3 (\text{g})$	
D. $2 \text{SO}_3 (\text{g}) \rightleftharpoons 2 \text{SO}_2 (\text{g}) + \text{O}_2 (\text{g})$	
E. $2\text{HI} (\text{g}) \rightleftharpoons \text{H}_2 (\text{g}) + \text{I}_2 (\text{g})$	

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**11. chem10b 15.1-12**

A sealed 1.0 L flask is charged with 0.500 mol of  $\text{I}_2$  and 0.500 mol of  $\text{Br}_2$ . An equilibrium reaction ensues:



When the container contents achieve equilibrium, the flask contains 0.84 mol of IBr. The value of  $K_{\text{eq}}$  is \_\_\_\_\_.

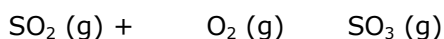
Student Response	Correct Answer
A. 2.8	
B. 110	
C. 4.0	
D. 6.1	
E. 11	

Score: 1/1

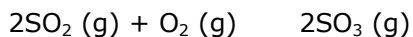
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**12. chem10b 15.2-17**

The  $K_{\text{eq}}$  for the equilibrium below is 0.112 at 700 °C.



What is the value of  $K_{\text{eq}}$  at this temperature for the following reaction?



Student Response	Correct Answer
A. 0.0125	
B. 0.0560	
C. 0.335	
D. 0.112	
E. 0.224	

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**1. chem10b 15.2-2**

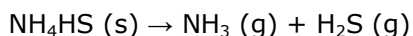
What role did Karl Bosch play in development of the Haber-Bosch process?

Student Response	Correct Answer
A. He discovered the reaction conditions necessary for formation of ammonia.	
B. He was the German industrialist who financed the research done by Haber.	
C. Haber was working in his lab with his instructor at the time he worked out the process.	
D. He originally isolated ammonia from camel dung and found a method for purifying it.	
E. He developed the equipment necessary for industrial production of ammonia.	

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**2. chem10b 15.5-5**

The equilibrium constant ( $K_p$ ) for the reaction below is  $7.00 \times 10^{-2}$  at 22 °C:



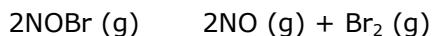
A sample of  $\text{NH}_4\text{HS}$  is placed in an evacuated container and allowed to come to equilibrium. The partial pressure of  $\text{NH}_3$  is then increased by the addition of 0.590 atm of  $\text{NH}_3$ . The partial pressure of  $\text{H}_2\text{S}$  at equilibrium is now \_\_\_\_\_ atm.

Student Response	Correct Answer
A. 0.855	
B. 0.101	
C. 0.691	
D. 0.119	
E. 0.265	

Score: 1/1

**3. chem10b 15.2-27**

Nitrosyl bromide decomposes according to the following equation.



A sample of NOBr (0.64 mol) was placed in a 1.00-L flask containing no NO or Br<sub>2</sub>. At equilibrium the flask contained .46 mol of NOBr. How many moles of NO and Br<sub>2</sub>, respectively, are in the flask at equilibrium?

Student Response	Correct Answer
A. 0.46, 0.46	
B. 0.18, 0.18	
C. 0.18, 0.090	
D. 0.18, 0.360	
E. 0.46, 0.23	

**4. chem10b 15.2-11**

The value of K<sub>eq</sub> for the following reaction is 0.25:



The value of K<sub>eq</sub> at the same temperature for the reaction below is \_\_\_\_\_.



Student Response	Correct Answer
A. 0.062	
B. 0.50	

C. 0.25

D. 0.12

E. 16

**5. chem10b 15.2-28**

Of the following equilibria, only \_\_\_\_\_ will shift to the left in response to a decrease in volume.

Student Response	Correct Answer
A. $2 \text{SO}_3 (\text{g}) \rightleftharpoons 2 \text{SO}_2 (\text{g}) + \text{O}_2 (\text{g})$	
B. $2\text{HI} (\text{g}) \rightleftharpoons \text{H}_2 (\text{g}) + \text{I}_2 (\text{g})$	
C. $\text{N}_2 (\text{g}) + 3 \text{H}_2 (\text{g}) \rightleftharpoons 2 \text{NH}_3 (\text{g})$	
D. $\text{H}_2 (\text{g}) + \text{Cl}_2 (\text{g}) \rightleftharpoons 2 \text{HCl} (\text{g})$	
E. $4 \text{Fe} (\text{s}) + 3 \text{O}_2 (\text{g}) \rightleftharpoons 2 \text{Fe}_2\text{O}_3 (\text{s})$	

**6. chem10b 15.1-5**

A reaction vessel is charged with hydrogen iodide, which partially decomposes to molecular hydrogen and iodine:



When the system comes to equilibrium at 425 °C,  $P_{\text{HI}} = 0.708 \text{ atm}$ , and  $P_{\text{H}_2} = P_{\text{I}_2}$

The value of  $K_p$  at this temperature is \_\_\_\_\_.

Student Response	Correct Answer
A. 54.3	
B. $1.30 \times 10^{-2}$	
C. $K_p$ cannot be calculated for this gas reaction when the volume of the reaction vessel is not given.	
D. $6.80 \times 10^{-2}$	
E. $1.84 \times 10^{-2}$	



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**7. chem10b 15.1-8**

Dinitrogen tetraoxide partially decomposes according to the following equilibrium:



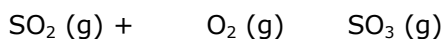
A 1.00-L flask is charged with 0.0400 mol of  $\text{N}_2\text{O}_4$ . At equilibrium at 373 K, 0.0055 mol of  $\text{N}_2\text{O}_4$  remains.  $K_{\text{eq}}$  for this reaction is \_\_\_\_\_.

Student Response	Correct Answer
A. $2.2 \times 10^{-4}$	
B. 0.022	
C. 0.22	
D. 0.87	
E. 13	

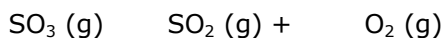
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**8. chem10b 15.2-18**

The  $K_{\text{eq}}$  for the equilibrium below is 0.112 at 700 °C.



What is the value of  $K_{\text{eq}}$  at this temperature for the following reaction?



Student Response	Correct Answer
A. 0.224	
B. 0.112	
C. 8.93	
D. -0.112	
E. 0.0125	

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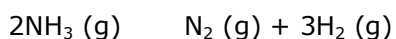
**9. chem10b 15.2-5**

Which one of the following will change the value of an equilibrium constant?

Student Response	Correct Answer
A. varying the initial concentrations of reactants	
B. changing temperature	
C. adding other substances that do not react with any of the species involved in the equilibrium	
D. varying the initial concentrations of products	
E. changing the volume of the reaction vessel	

**10. chem10b 15.2-33**

Consider the following reaction at equilibrium:



Le Chatelier's principle predicts that the moles of  $\text{H}_2$  in the reaction container will increase with \_\_\_\_\_

Student Response	Correct Answer
A. an increase in total pressure by the addition of helium gas (V and T constant)	
B. a decrease in the total pressure (T constant)	
C. some removal of $\text{NH}_3$ from the reaction vessel (V and T constant)	
D. addition of some $\text{N}_2$ to the reaction vessel (V and T constant)	
E. a decrease in the total volume of the reaction vessel (T constant)	

Score: 1/1

**11. chem10b 15.2-38**

The effect of a catalyst on an equilibrium is to \_\_\_\_\_.

Student Response	Correct Answer
A. slow the reverse reaction only	
B. increase the equilibrium constant so that products are favored	
C. increase the rate of the forward reaction only	

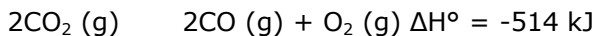
D. shift the equilibrium to the right

E. increase the rate at which equilibrium is achieved without changing the composition of the equilibrium mixture

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**12. chem10b 15.2-34**

Consider the following reaction at equilibrium:



Le Chatelier's principle predicts that adding  $\text{O}_2(\text{g})$  to the reaction container will

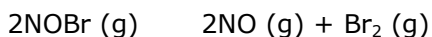
\_\_\_\_\_.

Student Response	Correct Answer
A. decrease the partial pressure of $\text{CO}_2(\text{g})$ at equilibrium	
B. increase the value of the equilibrium constant	
C. increase the partial pressure of $\text{CO}_2(\text{g})$ at equilibrium	
D. increase the partial pressure of $\text{CO}(\text{g})$ at equilibrium	
E. decrease the value of the equilibrium constant	

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**1. chem10b 15.2-27**

Nitrosyl bromide decomposes according to the following equation.



A sample of  $\text{NOBr}$  (0.64 mol) was placed in a 1.00-L flask containing no  $\text{NO}$  or  $\text{Br}_2$ . At

equilibrium the flask contained \_\_\_\_\_ of  $\text{NOBr}$ . How many moles of  $\text{NO}$  and  $\text{Br}_2$ , respectively, are in the flask at equilibrium?

Student Response	Correct Answer
A. 0.46, 0.46	
B. 0.18, 0.18	

C. 0.18, 0.090

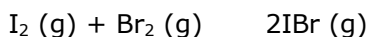
D. 0.18, 0.360

E. 0.46, 0.23

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**2. chem10b 15.1-12**

A sealed 1.0 L flask is charged with 0.500 mol of  $I_2$  and 0.500 mol of  $Br_2$ . An equilibrium reaction ensues:



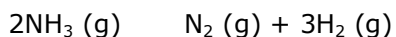
When the container contents achieve equilibrium, the flask contains 0.84 mol of IBr. The value of  $K_{eq}$  is \_\_\_\_\_.

Student Response	Correct Answer
A. 2.8	
B. 6.1	
C. 11	
D. 4.0	
E. 110	

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**3. chem10b 15.2-9**

The equilibrium constant for the gas phase reaction



is  $K_{eq} = 230$  at 300 °C. At equilibrium, \_\_\_\_\_.

Student Response	Correct Answer
A. reactants predominate	
B. only reactants are present	
C. roughly equal amounts of products and reactants are present	
D. only products are present	
E. products predominate	

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**4. chem10b 15.2-15**

The  $K_{\text{eq}}$  for the equilibrium below is  $7.52 \times 10^{-2}$  at 480 °C.



What is the value of  $K_{\text{eq}}$  at this temperature for the following reaction?

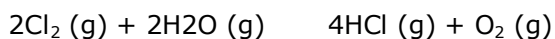


Student Response	Correct Answer
A. 13.3	
B. 0.150	
C. $5.66 \times 10^{-3}$	
D. 0.0752	
E. -0.0752	

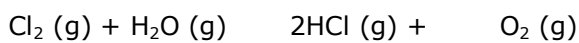
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**5. chem10b 15.2-14**

The  $K_{\text{eq}}$  for the equilibrium below is  $7.52 \times 10^{-2}$  at 480 °C.



What is the value of  $K_{\text{eq}}$  at this temperature for the following reaction?

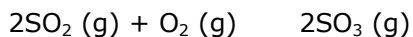


Student Response	Correct Answer
A. $5.66 \times 10^{-3}$	
B. 0.274	
C. 0.0752	
D. 0.150	
E. 0.0376	

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**6. chem10b 15.2-29**

The reaction below is exothermic:



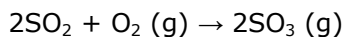
Le Chatelier's Principle predicts that \_\_\_\_\_ will result in an increase in the number of moles of  $\text{SO}_3(\text{g})$  in the reaction container.

Student Response	Correct Answer
A. decreasing the pressure	
B. increasing the pressure	
C. removing some oxygen	
D. increasing the temperature	
E. increasing the volume of the container	

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**7. chem10b 15.5-4**

At 900 K, the equilibrium constant ( $K_p$ ) for the following reaction is 0.345.



At equilibrium, the partial pressure of  $\text{SO}_2$  is 35.0 atm and that of  $\text{O}_2$  is 15.9 atm. The partial pressure of  $\text{SO}_3$  is \_\_\_\_\_ atm.

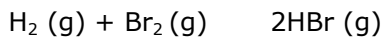
Student Response	Correct Answer
A. $6.20 \times 10^{-4}$	<input type="checkbox"/>
B. $4.21 \times 10^{-3}$	
C. 82.0	
D. 40.2	
E. 192	

Score: 1/1

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**8. chem10b 15.1-7**

At elevated temperatures, molecular hydrogen and molecular bromine react to partially form hydrogen bromide:



A mixture of 0.682 mol of  $\text{H}_2$  and 0.440 mol of  $\text{Br}_2$  is combined in a reaction vessel with a volume of 2.00 L. At equilibrium at 700 K, there are 0.566 mol of  $\text{H}_2$  present. At equilibrium, there are \_\_\_\_\_ mol of  $\text{Br}_2$  present in the reaction vessel.

Student Response	Correct Answer
A. 0.440	
B. 0.566	
C. 0.232	
D. 0.324	
E. 0.000	

Score: 1/1

**9. chem10b 15.2-25**

How does the reaction quotient of a reaction (Q) differ from the equilibrium constant ( $K_{eq}$ ) of the same reaction?

Student Response	Correct Answer
A. Q does not depend on the concentrations or partial pressures of reaction components.	
B. Q is the same as $K_{eq}$ when a reaction is at equilibrium.	
C. Q does not change with temperature.	
D. K does not depend on the concentrations or partial pressures of reaction components.	
E. $K_{eq}$ does not change with temperature, whereas Q is temperature dependent.	

Score: 0/1

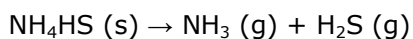
**10. chem10b 15.4-5**

Le Chatelier's principle states that if a system at equilibrium is disturbed, the equilibrium will shift to minimize the disturbance.

Student Response	Value	Correct Answer

**11. chem10b 15.5-5**

The equilibrium constant ( $K_p$ ) for the reaction below is  $7.00 \times 10^{-2}$  at 22 °C:



A sample of  $\text{NH}_4\text{HS}$  is placed in an evacuated container and allowed to come to equilibrium. The partial pressure of  $\text{NH}_3$  is then increased by the addition of 0.590 atm of  $\text{NH}_3$ . The partial pressure of  $\text{H}_2\text{S}$  at equilibrium is now \_\_\_\_\_ atm.

Student Response	Correct Answer
A. 0.119	
B. 0.691	
C. 0.265	
D. 0.855	
E. 0.101	

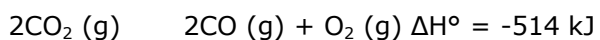
**12. chem10b 15.2-31**

In which of the following reactions would increasing pressure at constant temperature not change the concentrations of reactants and products, based on Le Châtelier's principle?

Student Response	Correct Answer
A. $2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{N}_2\text{O}(\text{g})$	
B. $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{NO}(\text{g})$	
C. $\text{N}_2(\text{g}) + 2\text{O}_2(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$	
D. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$	
E. $\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$	

**1. chem10b 15.2-34**

Consider the following reaction at equilibrium:



Le Châtelier's principle predicts that adding  $\text{O}_2(\text{g})$  to the reaction container will \_\_\_\_\_.

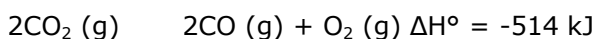
Student Response	Correct Answer
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A. increase the partial pressure of CO (g) at equilibrium
B. decrease the partial pressure of CO <sub>2</sub> (g) at equilibrium
C. increase the partial pressure of CO <sub>2</sub> (g) at equilibrium
D. decrease the value of the equilibrium constant
E. increase the value of the equilibrium constant

**2. chem10b 15.2-36**

Consider the following reaction at equilibrium.

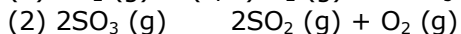
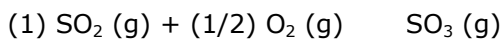


Le Chatelier's principle predicts that the equilibrium partial pressure of CO (g) can be maximized by carrying out the reaction \_\_\_\_\_.

Student Response	Correct Answer
A. at high temperature and high pressure	
B. at high temperature and low pressure	
C. at low temperature and low pressure	
D. at low temperature and high pressure	
E. in the presence of solid carbon	

**3. chem10b 15.2-10**

The equilibrium constant for reaction 1 is K. The equilibrium constant for reaction 2 is \_\_\_\_\_.

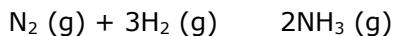


Student Response	Correct Answer
A. $1/K^2$	
B. $K^2$	
C. $1/2K$	
D. $-K^2$	

E. 2K

**4. chem10b 15.2-8**

The equilibrium constant for the gas phase reaction

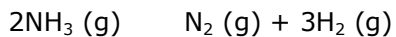


is  $K_{\text{eq}} = 4.34 \times 10^{-3}$  at 300 °C. At equilibrium, \_\_\_\_\_.

Student Response	Correct Answer
A. products predominate	
B. only products are present	
C. reactants predominate	
D. roughly equal amounts of products and reactants are present	
E. only reactants are present	

**5. chem10b 15.2-33**

Consider the following reaction at equilibrium:



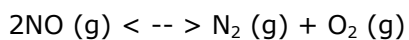
Le Chatelier's principle predicts that the moles of  $\text{H}_2$  in the reaction container will increase with \_\_\_\_\_

Student Response	Correct Answer
A. an increase in total pressure by the addition of helium gas (V and T constant)	
B. some removal of $\text{NH}_3$ from the reaction vessel (V and T constant)	
C. a decrease in the total volume of the reaction vessel (T constant)	
D. a decrease in the total pressure (T constant)	
E. addition of some $\text{N}_2$ to the reaction vessel (V and T constant)	

---

**6. chem10b 15.1-9**

At 200 °C, the equilibrium constant ( $K_p$ ) for the reaction below is  $2.40 \times 10^3$ .



A closed vessel is charged with 36.1 atm of NO. At equilibrium, the partial pressure of  $\text{O}_2$  is \_\_\_\_\_ atm.

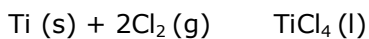
Student Response	Correct Answer
A. 294	
B. 18.1	
C. 6.00	
D. $1.50 \times 10^{-2}$	
E. 35.7	

Score: 0/1

---

**7. chem10b 15.2-23**

The equilibrium-constant expression for the reaction



is given by

Student Response	Correct Answer
A.	
B.	
C. $[\text{Cl}_2 \text{(g)}]^{-2}$	
D.	
E.	

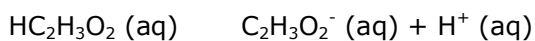
Score: 1/1

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**8. chem10b 15.1-6**

Acetic acid is a weak acid that dissociates into the acetate ion and a proton in aqueous

solution:



At equilibrium at 25 °C a 0.100 M solution of acetic acid has the following concentrations:

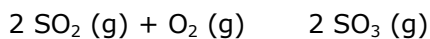
\_\_\_\_\_ and \_\_\_\_\_ The equilibrium constant,  $K_{\text{eq}}$ , for the ionization of acetic acid at \_\_\_\_\_ is \_\_\_\_\_.

Student Response	Correct Answer
A. $1.75 \times 10^{-7}$	
B. $1.79 \times 10^{-5}$	
C. $5.71 \times 10^4$	
D. $5.71 \times 10^6$	
E. 0.100	

---

**9. chem10b 15.2-21**

Consider the following equilibrium.



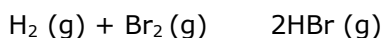
The equilibrium cannot be established when \_\_\_\_\_ is/are placed in a 1.0-L container.

Student Response	Correct Answer
A. 0.50 mol $\text{O}_2$ (g) and 0.50 mol $\text{SO}_3$ (g)	
B. 0.25 mol $\text{SO}_2$ (g) and 0.25 mol $\text{O}_2$ (g)	
C. 0.75 mol $\text{SO}_2$ (g)	
D. 0.25 mol of $\text{SO}_2$ (g) and 0.25 mol of $\text{SO}_3$ (g)	
E. 1.0 mol $\text{SO}_3$ (g)	

---

**10. chem10b 15.1-7**

At elevated temperatures, molecular hydrogen and molecular bromine react to partially form hydrogen bromide:



A mixture of 0.682 mol of  $\text{H}_2$  and 0.440 mol of  $\text{Br}_2$  is combined in a reaction vessel with a

volume of 2.00 L. At equilibrium at 700 K, there are 0.566 mol of  $\text{H}_2$  present. At equilibrium, there are \_\_\_\_\_ mol of  $\text{Br}_2$  present in the reaction vessel.

Student Response	Correct Answer
A. 0.000	
B. 0.232	
C. 0.440	
D. 0.324	
E. 0.566	

**11. chem10b 15.2-13**

The equilibrium expression for  $K_p$  for the reaction below is \_\_\_\_\_.



Student Response	Correct Answer
A.	
B.	
C. $[\text{O}_2]^3 / [\text{O}_3]^2$	
D.	
E.	

**12. chem10b 15.2-4**

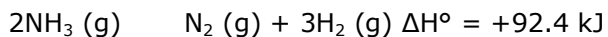
Which one of the following is true concerning the Haber process?

Student Response	Correct Answer
A. It is an industrial synthesis of sodium chloride that was discovered by Karl Haber.	
B. It is another way of stating LeChatelier's principle.	
C. It is a process for the synthesis of elemental chlorine.	
D. It is a process used for shifting equilibrium positions to the right for more economical chemical synthesis of a variety of substances.	

E. It is a process used for the synthesis of ammonia.

**1. chem10b 15.2-32**

Consider the following reaction at equilibrium:



Le Chatelier's principle predicts that adding  $\text{N}_2(\text{g})$  to the system at equilibrium will result in \_\_\_\_\_.

Student Response	Correct Answer
A. an increase in the value of the equilibrium constant	
B. removal of all of the $\text{H}_2(\text{g})$	
C. a decrease in the concentration of $\text{NH}_3(\text{g})$	
D. a lower partial pressure of $\text{N}_2$	
E. a decrease in the concentration of $\text{H}_2(\text{g})$	

**2. chem10b 15.1-13**

The equilibrium constant ( $K_p$ ) for the interconversion of  $\text{PCl}_5$  and  $\text{PCl}_3$  is 0.0121:



A vessel is charged with  $\text{PCl}_5$ , giving an initial pressure of 0.123 atm. At equilibrium, the partial pressure of  $\text{PCl}_3$  is \_\_\_\_\_ atm.

Student Response	Correct Answer
A. 0.045	
B. 0.033	
C. 0.078	
D. 0.090	
E. 0.123	

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**3. chem10b 15.4-5**

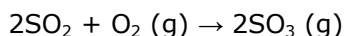
Le Chatelier's principle states that if a system at equilibrium is disturbed, the equilibrium will shift to minimize the disturbance.

Student Response	Value	Correct Answer

---

**4. chem10b 15.5-4**

At 900 K, the equilibrium constant ( $K_p$ ) for the following reaction is 0.345.



At equilibrium, the partial pressure of  $\text{SO}_2$  is 35.0 atm and that of  $\text{O}_2$  is 15.9 atm. The partial pressure of  $\text{SO}_3$  is \_\_\_\_\_ atm.

Student Response	Correct Answer
A. $6.20 \times 10^{-4}$	
B. 82.0	
C. $4.21 \times 10^{-3}$	
D. 40.2	
E. 192	

---

**5. chem10b 15.2-30**

For the endothermic reaction



Le Chatelier's principle predicts that \_\_\_\_\_ will result in an increase in the number of moles of  $\text{CO}_2$ .

Student Response	Correct Answer
A. removing some of the $\text{CaCO}_3 (\text{s})$	
B. increasing the temperature	
C. decreasing the temperature	
D. increasing the pressure	

E. adding more  $\text{CaCO}_3$  (s)

**6. chem10b 15.4-4**

In an exothermic equilibrium reaction, increasing the reaction temperature favors the formation of reactants.

Student Response	Value	Correct Answer
False	0%	True

Score: 0/1

**7. chem10b 15.2-38**

The effect of a catalyst on an equilibrium is to \_\_\_\_\_.

Student Response	Correct Answer
A. increase the rate at which equilibrium is achieved without changing the composition of the equilibrium mixture	
B. increase the rate of the forward reaction only	
C. shift the equilibrium to the right	
D. slow the reverse reaction only	
E. increase the equilibrium constant so that products are favored	

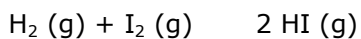
**8. chem10b 15.4-2**

The effect of a catalyst on a chemical reaction is to react with product, effectively removing it and shifting the equilibrium to the right.

Student Response	Value	Correct Answer

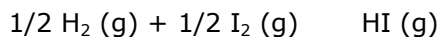
**9. chem10b 15.1-1**

The value of  $K_{\text{eq}}$  for the equilibrium



is 794 at 25 °C. What is the value of  $K_{\text{eq}}$  for the equilibrium below?



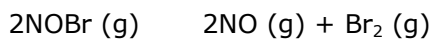


Student Response	Correct Answer
A. 28	
B. 1588	
C. 397	
D. 0.035	
E. 0.0013	

---

**10. chem10b 15.2-27**

Nitrosyl bromide decomposes according to the following equation.



A sample of NOBr (0.64 mol) was placed in a 1.00-L flask containing no NO or Br<sub>2</sub>. At

equilibrium the flask contained \_\_\_\_\_ of NOBr. How many moles of NO and Br<sub>2</sub>, respectively, are in the flask at equilibrium?

Student Response	Correct Answer
A. 0.46, 0.46	
B. 0.18, 0.18	
C. 0.18, 0.090	
D. 0.18, 0.360	
E. 0.46, 0.23	

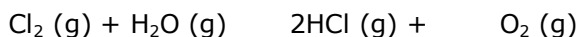
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**11. chem10b 15.2-14**

The K<sub>eq</sub> for the equilibrium below is  $7.52 \times 10^{-2}$  at 480 °C.



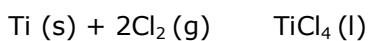
What is the value of K<sub>eq</sub> at this temperature for the following reaction?



Student Response	Correct Answer
A. 0.0752	
B. $5.66 \times 10^{-3}$	
C. 0.0376	
D. 0.274	
E. 0.150	

**12. chem10b 15.2-23**

The equilibrium-constant expression for the reaction



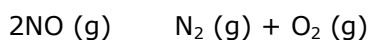
is given by

Student Response	Correct Answer
A. $[\text{Cl}_2 \text{ (g)}]^{-2}$	
B.	
C.	
D.	
E.	

Score: 1/1

**13. chem10b 15.1-9**

At 200 °C, the equilibrium constant ( $K_p$ ) for the reaction below is  $2.40 \times 10^3$ .



A closed vessel is charged with 36.1 atm of NO. At equilibrium, the partial pressure of O<sub>2</sub> is \_\_\_\_\_ atm.

Student Response	Correct Answer
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A. 6.00
B. 18.1
C. 35.7
D. 294
E. $1.50 \times 10^{-2}$

Score: 1/1

**14. chem10b 15.1-11**

In the coal-gasification process, carbon monoxide is converted to carbon dioxide via the following reaction:

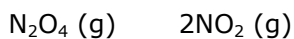


In an experiment, 0.35 mol of CO and 0.40 mol of H<sub>2</sub>O were placed in a 1.00-L reaction vessel. At equilibrium, there were 0.19 mol of CO remaining.  $K_{\text{eq}}$  at the temperature of the experiment is \_\_\_\_\_.

Student Response	Correct Answer
A. 5.47	
B. 1.78	
C. 1.0	
D. 0.75	
E. 0.56	

**15. chem10b 15.2-12**

Which of the following expressions is the correct equilibrium-constant expression for the equilibrium between dinitrogen tetroxide and nitrogen dioxide?



Student Response	Correct Answer
A. $[\text{NO}_2][\text{N}_2\text{O}_4]$	
B.	
C. $[\text{NO}_2]^2[\text{N}_2\text{O}_4]$	

D.  $[\text{NO}_2]^2 / [\text{N}_2\text{O}_4]$

E.

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**16. chem10b 15.2-5**

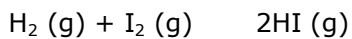
Which one of the following will change the value of an equilibrium constant?

Student Response	Correct Answer
A. varying the initial concentrations of reactants	
B. changing temperature	
C. adding other substances that do not react with any of the species involved in the equilibrium	
D. varying the initial concentrations of products	
E. changing the volume of the reaction vessel	

---

**17. chem10b 15.1-4**

Consider the following chemical reaction:



At equilibrium in a particular experiment, the concentrations of  $\text{H}_2$ ,  $\text{I}_2$ , and HI were \_\_\_\_\_ and \_\_\_\_\_ respectively. The value of  $K_{\text{eq}}$  for this reaction is \_\_\_\_\_.

Student Response	Correct Answer
A. 6.1	
B. 111	
C. 23	
D. $9.0 \times 10^{-3}$	
E. 61	

---

**18. chem10b 15.1-8**

Dinitrogen tetraoxide partially decomposes according to the following equilibrium:



A 1.00-L flask is charged with .0400 mol of  $\text{N}_2\text{O}_4$ . At equilibrium at 373 K, 0.0055 mol of  $\text{N}_2\text{O}_4$  remains.  $K_{\text{eq}}$  for this reaction is \_\_\_\_\_.

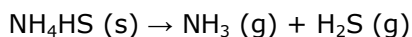
Student Response	Correct Answer
A. $2.2 \times 10^{-4}$	
B. 0.022	
C. 0.22	
D. 0.87	
E. 13	

Score: 1/1

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**19. chem10b 15.5-5**

The equilibrium constant ( $K_p$ ) for the reaction below is  $7.00 \times 10^{-2}$  at 22 °C:



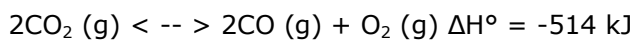
A sample of  $\text{NH}_4\text{HS}$  is placed in an evacuated container and allowed to come to equilibrium. The partial pressure of  $\text{NH}_3$  is then increased by the addition of 0.590 atm of  $\text{NH}_3$ . The partial pressure of  $\text{H}_2\text{S}$  at equilibrium is now \_\_\_\_\_ atm.

Student Response	Correct Answer
A. 0.691	
B. 0.119	
C. 0.855	
D. 0.265	
E. 0.101	

---

**20. chem10b 15.2-35**

Consider the following reaction at equilibrium:



Le Chatelier's principle predicts that an increase in temperature will \_\_\_\_\_.

Student Response	Correct Answer
A. decrease the partial pressure of CO <sub>2</sub> (g)	
B. decrease the value of the equilibrium constant	
C. increase the partial pressure of O <sub>2</sub> (g)	
D. increase the value of the equilibrium constant	
E. increase the partial pressure of CO	