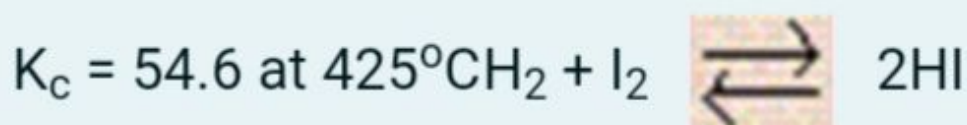


A quantity of HI was sealed in a tube, heated to 425°C and held at this temperature until equilibrium was reached. The concentration of HI in the tube at equilibrium was found to be 0.0706 mol/L. Calculate the equilibrium concentration of H₂ (and I₂). For the gas-phase reaction



- ✓ 9.55 x 10⁻³ M .a ☒
- 1.85 x 10⁻⁴ M .b ☐
- 1.17 x 10⁻³ M .c ☐
- 4.78 x 10⁻³ M .d ☐

الإجابة الصحيحة هي:

9.55 x 10⁻³ M

Which is the correct equilibrium-constant expression for the equilibrium between dinitrogen tetroxide and nitrogen dioxide

$$\text{N}_2\text{O}_4 (\text{g}) \rightleftharpoons 2\text{NO}_2 (\text{g})$$

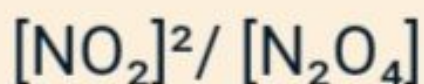
✓ $[\text{NO}_2]^2 / [\text{N}_2\text{O}_4]$.a ☒

$[\text{NO}_2] [\text{N}_2\text{O}_4]$.b ☐

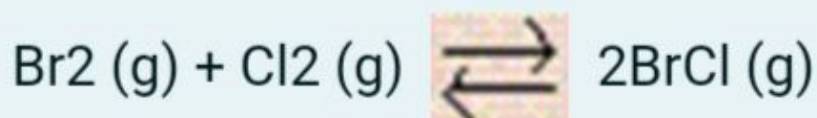
$[\text{NO}_2] / [\text{N}_2\text{O}_4]^2$.c ☐

$[\text{NO}_2] / [\text{N}_2\text{O}_4]$.d ☐

الإجابة الصحيحة هي:



At 400 K, the equilibrium constant for the reaction



is $K_p = 7.0$. A closed vessel at 400 K is charged with 1.00 atm of $\text{Br}_2(\text{g})$, 1.00 atm of $\text{Cl}_2(\text{g})$, and 2.00 atm of $\text{BrCl}(\text{g})$. Use Q to determine which of the statements below is true.

The reaction will go to completion since there are equal amounts of Br_2 and Cl_2 . .a ☐

✓ The equilibrium partial pressure of $\text{BrCl}(\text{g})$ will be greater than 2.00 atm. .b ☒

The equilibrium partial pressure of Br_2 will be greater than 1.00 atm. .c ☐

At equilibrium, the total pressure in the vessel will be less than the initial total pressure. .d ☐

If, at a given temperature, the equilibrium constant for the reaction $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons 2\text{HCl}(\text{g})$ is 6.0, then the equilibrium constant for the reaction

$\text{HCl}(\text{g}) \rightleftharpoons (1/2)\text{H}_2(\text{g}) + (1/2)\text{Cl}_2(\text{g})$ can be represented as

- ☐ a. 6.0
- ☐ b. 0.17
- ☐ c. 36
- ☒ d. 0.41

الإجابة الصحيحة هي:

0.41

The effect of a catalyst on an equilibrium is to _____.

- ✓ .a ☒ increase the rate at which equilibrium is achieved without changing the composition of the equilibrium mixture
- .b ☐ slow the reverse reaction only
- .c ☐ increase the equilibrium constant so that products are favored
- .d ☐ increase the rate of the forward reaction only
- .e ☐ shift the equilibrium to the right

الإجابة الصحيحة هي:

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

Which is the correct equilibrium-
constant expression for this reaction



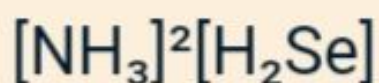
✓ ☒ a. $[\text{NH}_3]^2[\text{H}_2\text{Se}]$

☐ b. $1 / [\text{NH}_4)_2\text{Se}]$

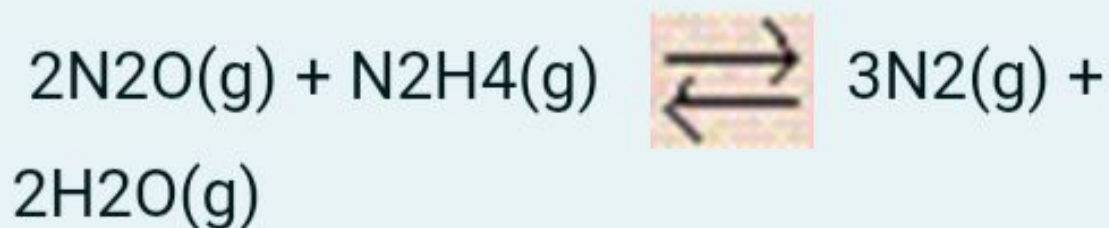
☐ c. $[\text{NH}_3] [\text{H}_2\text{Se}] / [\text{NH}_4)_2\text{Se}]$

☐ d. $[\text{NH}_4)_2\text{Se}] / [\text{NH}_3]^2[\text{H}_2\text{Se}]$

الإجابة الصحيحة هي:



The following reaction is investigated (assume an ideal gas mixture).



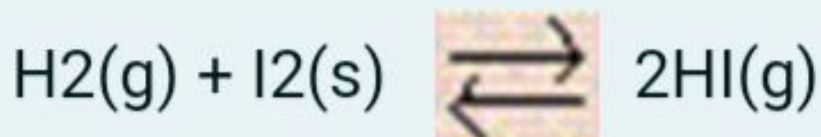
Initially there are 0.10 mol of N_2O and 0.30 mol of N_2H_4 , in a 20.0-L container. If there is 0.050 mol of N_2O at equilibrium, how many moles of N_2 are present at equilibrium?

- 0.15 .a ☐
- 0.067 .b ☐
- ✓ 0.075 .c ☒
- 0.15 .d ☐

الإجابة الصحيحة هي:

0.075

Consider the following reaction at equilibrium:



If the pressure on the system is increased by changing the volume, the left side is favored.

false .a ☐

✓ true .b ☒

الإجابة الصحيحة هي:

true

Among the following oxoacids, the correct
:decreasing order of acid strength is

$\text{HClO}_2 > \text{HClO}_4 > \text{HClO}_3 > \text{HOCl}$.a ☐

✓ $\text{HClO}_4 > \text{HClO}_3 > \text{HClO}_2 > \text{HOCl}$.b ☒

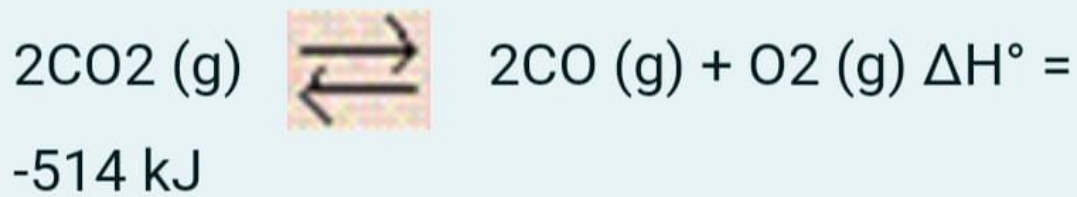
$\text{HOCl} > \text{HClO}_2 > \text{HClO}_3 > \text{HClO}_4$.c ☐

$\text{HClO}_4 > \text{HOCl} > \text{HClO}_2 > \text{HClO}_3$.d ☐

الإجابة الصحيحة هي:

$\text{HClO}_4 > \text{HClO}_3 > \text{HClO}_2 > \text{HOCl}$

Consider the following reaction at equilibrium:



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

- ☒ a. increase the partial pressure of $\text{CO}_2 (\text{g})$ at equilibrium
- ☐ b. increase the partial pressure of $\text{CO} (\text{g})$ at equilibrium
- ☐ c. increase the value of the equilibrium constant
- ☐ d. decrease the partial pressure of $\text{CO}_2 (\text{g})$ at equilibrium

الإجابة الصحيحة هي:

increase the partial pressure of $\text{CO}_2 (\text{g})$ at equilibrium

For a specific reaction, which of the following statements can be made about K , the equilibrium constant?

- a ☐ It increases if the concentration of one of the products is increased.
- b ☐ It increases if the concentration of one of the reactants is increased.
- c ☐ It always remains the same at different reaction conditions.
- d ☐ It may be changed by the addition of a catalyst.
- e ☒ It changes with changes in the temperature.

الإجابة الصحيحة هي:

It changes with changes in the temperature.

:The reversible reaction



has come to equilibrium in a vessel of specific volume at a given temperature.

Before the reaction began, the concentrations of the reactants were 0.060 mol/L of SO_2 and 0.050 mol/L of O_2 . After equilibrium is reached, the concentration of SO_3 is 0.040 mol/L. What is the equilibrium concentration of O_2

0.010 M .a ☐

✓ 0.030 M .b ☒

0.040 M .c ☐

0.020 M .d ☐

الإجابة الصحيحة هي:

0.030 M

If the equilibrium constant for

$A + B \rightleftharpoons C$ is 0.169,

then the equilibrium constant for $2C \rightleftharpoons 2A + 2B$ is

✓ 35.0 .a ☒

5.92 .b ☐

0.338 .c ☐

0.662 .d ☐

الإجابة الصحيحة هي:

35.0

When the system $A + B \rightleftharpoons C + D$ is at equilibrium

- a ☐ the forward reaction has stopped.
- b ☐ the sum of the concentrations of A and B must equal the sum of the concentrations of C and D.
- c ☒ neither the forward nor the reverse reaction has stopped.
- d ☐ both the forward and the reverse reactions have stopped.

الإجابة الصحيحة هي:

neither the forward nor the reverse reaction has stopped.

For a certain reaction at 25.0°C, the value of K is 1.2×10^{-3} . At 50.0°C the value of K is 3.4×10^{-1} . This means that the reaction is

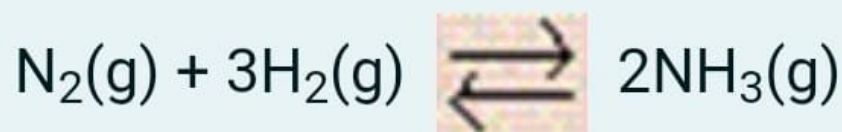
✓endothermic .a ☒

exothermic .b ☐

الإجابة الصحيحة هي:

endothermic

Nitrogen gas (N₂) reacts with hydrogen gas (H₂) to form ammonia (NH₃)



At 200°C in a closed container, 1.1 atm of nitrogen gas is mixed with 2.1 atm of hydrogen gas. At equilibrium, the total pressure is 2.2 atm. Calculate the partial pressure of hydrogen gas at equilibrium

- 1.8 atm .a ☐
- 0.70 atm .b ☐
- 2.1 atm .c ☐
- ✓ 0.60 atm .d ☒
- 0.0 atm .e ☐

الإجابة الصحيحة هي:

0.60 atm

:According to Lewis concept, an acid is

- a ☐ electron pair donor
- b ☐ proton acceptor
- c ☐ proton donor
- d ☒ electron pair acceptor

الإجابة الصحيحة هي:

electron pair acceptor

What is the hydronium ion concentration of
a 0.010 M solution of acetic acid

K_a for acetic acid is 1.8×10^{-5}

1.8×10^{-3} .a ☐

✓ 4.2×10^{-4} .b ☒

1.0×10^{-2} .c ☐

1.8×10^{-5} .d ☐

الإجابة الصحيحة هي:

4.2×10^{-4}

Pure water is known to be which of the following

Neither weak nor strong .a ☐

Strong electrolyte .b ☐

Not an electrolyte .c ☐

✓ Weak electrolyte .d ☒

الإجابة الصحيحة هي:

Weak electrolyte

All Brønsted acids are Lewis acids, but the reverse is not true.

False .a ☐

✓ True .b ☒

الإجابة الصحيحة هي:

True

A salt 'X' is dissolved in water of pH=7. The resulting solution becomes alkaline in nature. The salt is made up of

- a ☐ A strong acid and weak base
- ✓ b ☒ A weak acid and strong base
- c ☐ A weak acid and weak base
- d ☐ A strong acid and strong base

الإجابة الصحيحة هي:

A weak acid and strong base

What is the pH of 500 mL of solution containing 0.0124 grams of Ca(OH)_2

✓ 10.83 .a ☒

11.04 .b ☐

9.68 .c ☐

3.17 .d ☐

الإجابة الصحيحة هي:

10.83

Consider the following reaction at equilibrium:



Le Chatelier's principle predicts that the moles of H_2 in the reaction container will increase with _____

an increase in total pressure by the addition of helium gas (V and T constant) .a ☐

✓ a decrease in the total pressure (T constant) .b ☒

addition of some N_2 to the reaction vessel (V and T constant) .c ☐

a decrease in the total volume of the reaction vessel (T constant) .d ☐

some removal of NH_3 from the reaction vessel (V and T constant) .e ☐

The following acids have been arranged in the order of decreasing acid strength.

-Identify the correct order

ClOH(I)

BrOH(II)

IOH(III)

$\text{I} > \text{III} > \text{II}$.a ☐

✓ $\text{I} > \text{II} > \text{III}$.b ☒

$\text{II} > \text{I} > \text{III}$.c ☐

$\text{III} > \text{II} > \text{I}$.d ☐

الإجابة الصحيحة هي:

$\text{I} > \text{II} > \text{III}$

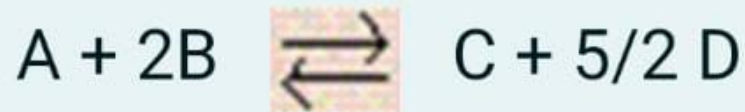
Pure _____ and pure _____ are excluded from equilibrium-constant expressions

- liquids and elements .a ☐
- gases and compounds .b ☐
- Acids and bases .c ☐
- ✓ solids and liquids .d ☒

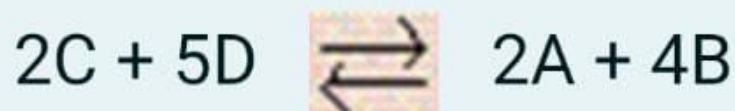
الإجابة الصحيحة هي:

solids and liquids

If the equilibrium constant for the reaction



has a value of 4.0, what is the value of the equilibrium constant for the reaction



?at the same temperature

✓ 0.063 .a ☒

0.25 .b ☐

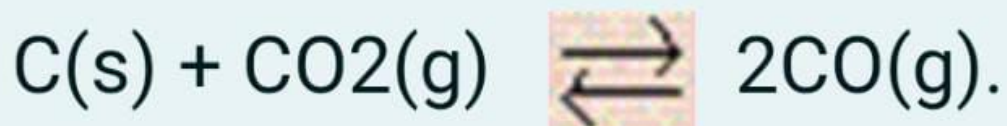
8 .c ☐

2.0 .d ☐

الإجابة الصحيحة هي:

0.063

Consider the reaction



At 1273 K the K_p value is 167.5.

What is the P_{CO} at equilibrium if the P_{CO_2} is 0.10 atm at this temperature?

✓ 4.1 atm .a ☒

16.7 atm .b ☐

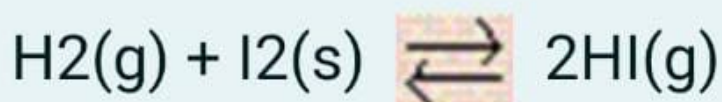
2.0 atm .c ☐

1.4 atm .d ☐

الإجابة الصحيحة هي:

4.1 atm

Consider the following endothermic reaction at equilibrium:



Which of the following statements about the equilibrium is false?

- a ☐ If the pressure on the system is increased by changing the volume, the left side is favored.
- b ☐ This is a heterogeneous equilibrium.
- c ☒ Adding more $\text{H}_2(\text{g})$ increases the equilibrium constant.
- d ☐ If the system is heated, the right side is favored.
- e ☐ Removing HI as it forms forces the equilibrium to the right.

الإجابة الصحيحة هي:

Adding more $\text{H}_2(\text{g})$ increases the equilibrium constant.

What is the equilibrium expression for
 $2\text{NO}_2\text{Cl}(\text{aq}) \rightleftharpoons 2\text{NO}_2(\text{aq}) + \text{Cl}_2(\text{aq})$

✓ $K = [\text{NO}_2]^2[\text{Cl}_2]/[\text{NO}_2\text{Cl}]^2$.a ☒

$K = 2[\text{NO}_2\text{Cl}]/2[\text{NO}_2][\text{Cl}_2]$.b ☐

$K = 2[\text{NO}_2][\text{Cl}_2]/2[\text{NO}_2\text{Cl}]$.c ☐

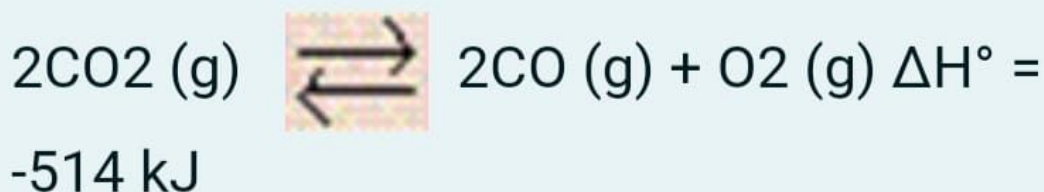
$K = [\text{NO}_2\text{Cl}]^2/[\text{NO}_2]^2[\text{Cl}_2]$.d ☐

$K = [\text{NO}_2\text{Cl}]^2[\text{NO}_2]^22[\text{Cl}_2]$.e ☐

الإجابة الصحيحة هي:

$$K = [\text{NO}_2]^2[\text{Cl}_2]/[\text{NO}_2\text{Cl}]^2$$

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 _____.

- at high temperature and low pressure .a ☐
- at high temperature and high pressure .b ☐
- at low temperature and high pressure .c ☐
- ✓ at low temperature and low pressure .d ☒

الإجابة الصحيحة هي:

at low temperature and low pressure

Which of the following statements concerning equilibrium is not true?

✓ The equilibrium constant is independent of temperature. .a ☒

A system moves spontaneously toward a state of equilibrium. .b ☐

Equilibrium in molecular systems is dynamic, with two opposing processes balancing one another. .c ☐

الإجابة الصحيحة هي:

The equilibrium constant is independent of temperature.

For the endothermic reaction



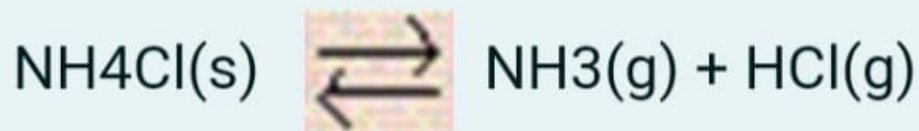
Le Chatelier's principle predicts that _____ will result in an increase in the number of moles of CO_2 .

- ☒ a. increasing the temperature
- ☐ b. removing some of the $\text{CaCO}_3 (\text{s})$
- ☐ c. decreasing the temperature
- ☐ d. increasing the pressure

الإجابة الصحيحة هي:

increasing the temperature

A 10.0-g sample of solid NH_4Cl is heated in a 5.00-L container to 900°C . At equilibrium the pressure of $\text{NH}_3(\text{g})$ is 1.20 atm.



The equilibrium constant, K_p , for the reaction is:

31.0 .a ☐

1.20 .b ☐

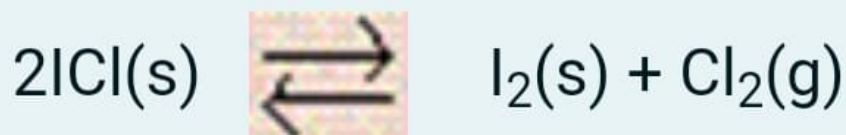
✓ 1.44 .c ☒

2.40 .d ☐

الإجابة الصحيحة هي:

1.44

The conventional equilibrium constant :expression (K_c) for the system below is



a. $\frac{[\text{I}_2][\text{Cl}_2]}{2[\text{ICl}]}$ ☐

b. $\frac{[\text{I}_2][\text{Cl}_2]}{[\text{ICl}]^2}$ ☐

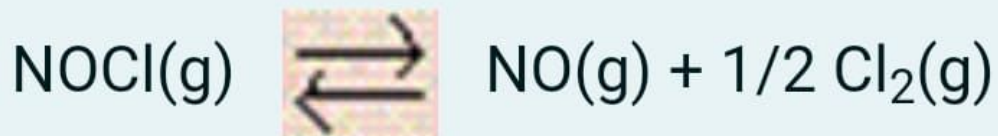
c. $\frac{[\text{Cl}_2]}{[\text{ICl}]^2}$ ☐

d. $[\text{Cl}_2]$ ☒

الإجابة الصحيحة هي:



Nitrosyl chloride, NOCl, dissociates on heating as shown below. When a 1.50 gram sample of pure NOCl is heated at 350°C in a volume of 1.00 liter, the percent dissociation is found to be 57.2%. Calculate K_c for the reaction as written.



✓ 0.107 .a ☒

9.26 .b ☐

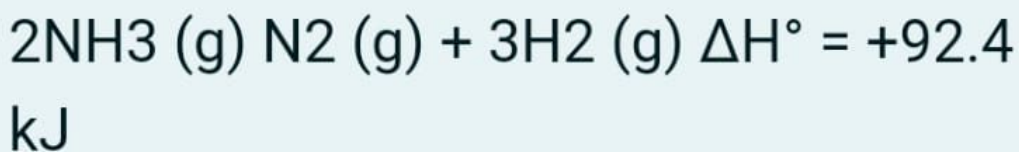
0.876 .c ☐

1.75×10^{-4} .d ☐

الإجابة الصحيحة هي:

0.107

Consider the following reaction at equilibrium:



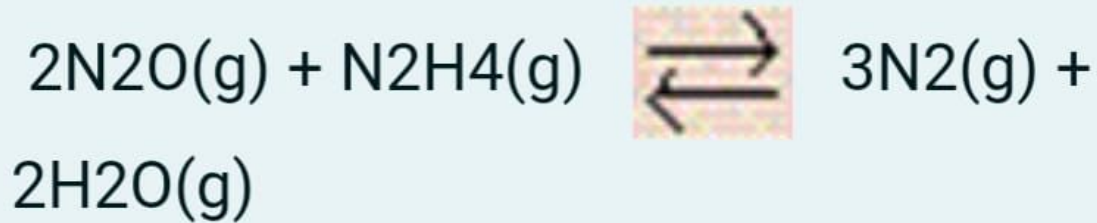
Le Chatelier's principle predicts that adding $\text{N}_2(\text{g})$ to the system at equilibrium will result in _____.

- ☒ a decrease in the concentration of $\text{H}_2(\text{g})$.a
- ☐ removal of all of the $\text{H}_2(\text{g})$.b
- ☐ a lower partial pressure of N_2 .c
- ☐ a decrease in the concentration of $\text{NH}_3(\text{g})$.d

الإجابة الصحيحة هي:

a decrease in the concentration of $\text{H}_2(\text{g})$

The following reaction is investigated (assume an ideal gas mixture):



Initially there are 0.10 moles of N_2O and 0.25 moles of N_2H_4 , in a 10.0-L container. If there are 0.06 moles of N_2O at equilibrium, how many moles of N_2 are present at equilibrium?

0.04 .a ☐

0.9 .b ☐

0.02 .c ☐

✓ 0.06 .d ☒

الإجابة الصحيحة هي:

0.06

Which of the following statements is true?

.a ☐ An endothermic reaction shifts toward reactants when heat is added to the reaction.

.b ☐ The concentration of the products equals that of the reactants and is constant at equilibrium.

.c ☐ Catalysts are an effective means of changing the position of an equilibrium.

✓ .d ☒ When two opposing processes are proceeding at identical rates, the system is at equilibrium.

الإجابة الصحيحة هي:

When two opposing processes are proceeding at identical rates, the system is at equilibrium.

How is the reaction quotient used to determine whether a system is at equilibrium?

The reaction is at equilibrium when $Q < K_{eq}$. .a ☐

✓ The reaction is at equilibrium when $Q = K_{eq}$. .b ☒

The reaction is at equilibrium when $Q > K_{eq}$. .c ☐

At equilibrium, the reaction quotient is undefined. .d ☐

الإجابة الصحيحة هي:

The reaction is at equilibrium when $Q = K_{eq}$.

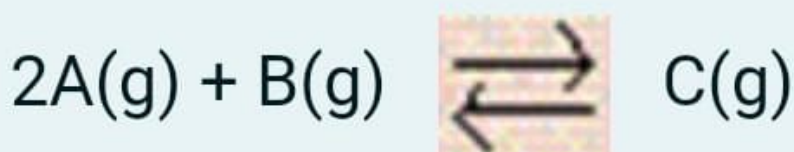
_____, At equilibrium

- ✓ ☒ .a the rates of the forward and reverse reactions are equal
- ☐ .b the value of the equilibrium constant is 1
- ☐ .c the rate constants of the forward and reverse reactions are equal
- ☐ .d all chemical reactions have ceased
توقف

الإجابة الصحيحة هي:

the rates of the forward and reverse reactions are equal

Consider the reversible reaction at
equilibrium at 392°C



The partial pressures are found to be: A: 6.70 atm, B: 10.1 atm, C: 3.60 atm. Evaluate K_p for this reaction

0.0532 .a ☐

54.5 .b ☐

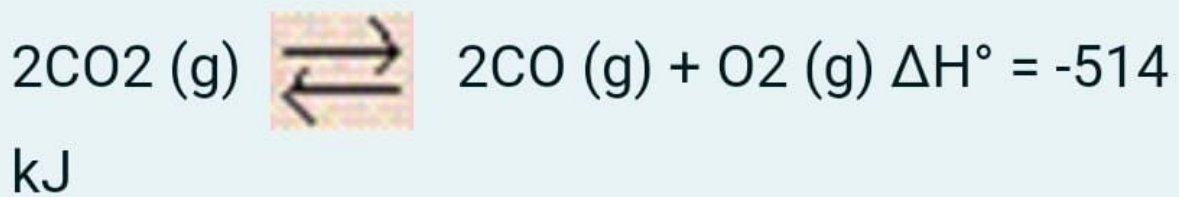
✓ 7.94 x 10⁻³ .c ☒

0.146 .d ☐

الإجابة الصحيحة هي:

7.94 x 10⁻³

Consider the following reaction at equilibrium:



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

decrease the partial pressure of CO_2 (g) .a ☐

✓ decrease the value of the equilibrium constant .b ☒

increase the value of the equilibrium constant .c ☐

increase the partial pressure of CO .d ☐

الإجابة الصحيحة هي:

decrease the value of the equilibrium constant

Given the equilibrium equation:



When 2.0 moles of A and 4.0 moles of B are added to a 10.0 L container, an equilibrium established in which 1.4 moles of C are found.

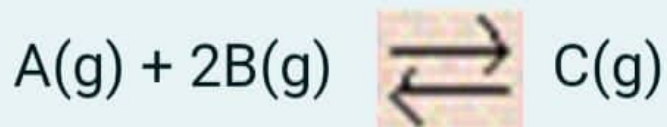
Find the equilibrium concentrations of A, B and C.

- ☒ a. 0.06, 0.12, 0.14
- ☐ b. 0.12, 0.14, 0.06
- ☐ c. 0.14, 0.12, 0.06
- ☐ d. 0.12, 0.06, 0.14

الإجابة الصحيحة هي:

0.06, 0.12, 0.14

For the reaction given below, 2.00 moles of A and 3.00 moles of B are placed in a 6.00-L container.



At equilibrium, the concentration of A is 0.300 mol/L. What is the value of K?

0.146 .a ☐

0.300 .b ☐

✓ 0.589 .c ☒

0.253 .d ☐

الإجابة الصحيحة هي:

0.589

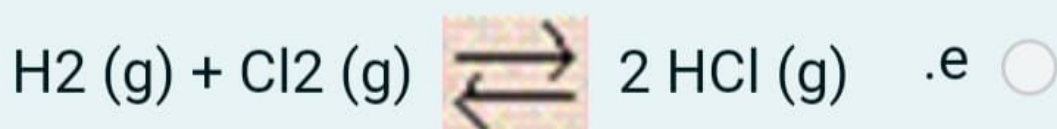
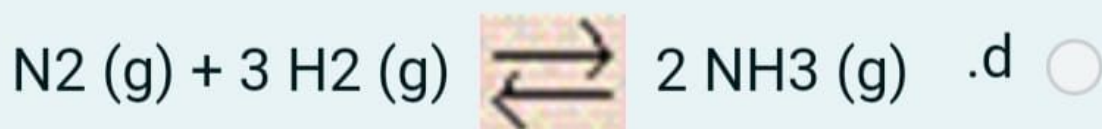
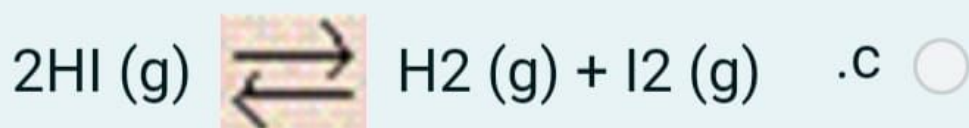
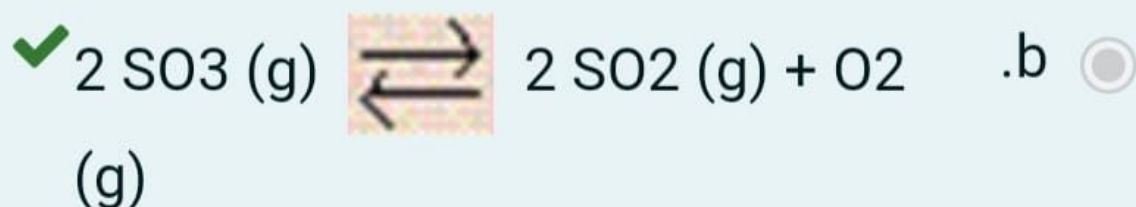
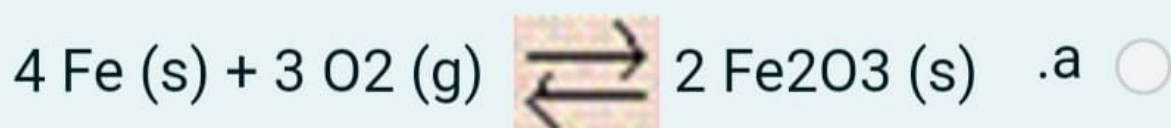
The equilibrium constant for the gas phase reaction: $\text{N}_2 (\text{g}) + 3\text{H}_2 (\text{g}) \rightleftharpoons 2\text{NH}_3 (\text{g})$ is $K_{\text{eq}} = 4.34 \times 10^{-3}$ at 300°C . At equilibrium _____.

- ☒ a. ☐ ☐ ☐ ☐
- reactants predominate تغلب
roughly equal amounts of products
and reactants are present
products predominate تغلب
only reactants are present

الإجابة الصحيحة هي:

reactants predominate تغلب

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



الإجابة الصحيحة هي:



Consider the equation



At a particular temperature, $K = 1.6 \times 10^4$

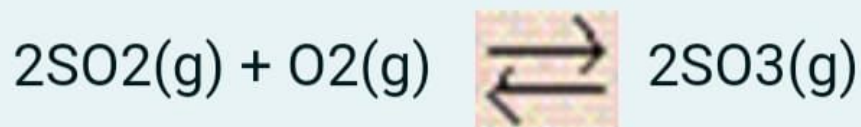
Addition of chemical B to an equilibrium mixture of the above will

- a ☐ cause [C] to increase.
- b ☐ have no effect.
- c ☒ cause [A] to increase.
- d ☐ cannot be determined

الإجابة الصحيحة هي:

cause [A] to increase.

Consider the reaction



at constant temperature. Initially a container is filled with pure $\text{SO}_3(\text{g})$ at a pressure of 2 atm, after which equilibrium is allowed to be reached. If y is the partial pressure of O_2 at equilibrium, what is the value of K_p ?

$(2 - y)^2/(2y^2)$ 👍 .a ☐

$^2/(y^2)(2y)(2y - 2)$.b ☐

$^2/(y^2)(y/2)(2y - 2)$.c ☐

✓ $(2 - 2y)^2/(2y^2)$ 👍 .d ☒

الإجابة الصحيحة هي:

$(2 - 2y)^2/(2y^2)$ 👍

Consider the gas-phase equilibrium system
:represented by the equation



Given that the forward reaction (the conversion of "left-hand" species to "right-hand" species) is **endothermic**, which of the following changes will **decrease** the
?equilibrium amount of H_2O

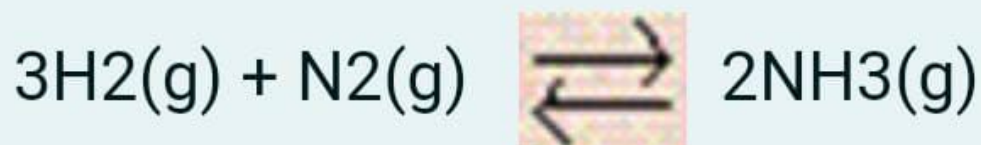
adding more oxygen .a ☐

adding a solid phase catalyst .b ☐

✓ increasing the temperature at constant pressure .c ☒

decreasing the volume of the container (the total pressure increases) .d ☐

Initially 2.0 moles of $\text{N}_2(\text{g})$ and 4.0 moles of $\text{H}_2(\text{g})$ were added to a 1.0-liter container and the following reaction then occurred:



The equilibrium concentration of $\text{NH}_3(\text{g}) = 0.68$ moles/liter at 700°C .

The value for K at 700°C for the formation of ammonia is:

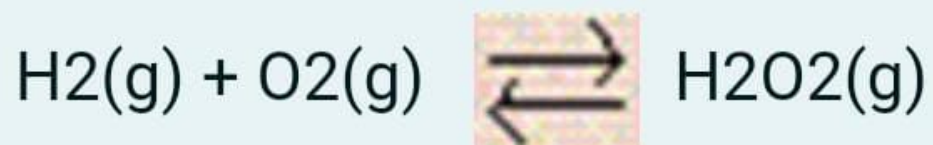
✓ 1.1×10^{-2} .a ☒

1.4×10^{-1} .b ☐

3.6×10^{-3} .c ☐

5.0×10^{-2} .d ☐

The value of K_p for the reaction



is 2.3×10^6 at 640K.

Determine the value for K_c for this reaction at 640K.

✓ 1.2×10^8 .a ☒

4.4×10^4 .b ☐

4.3×10^{-7} .c ☐

2.3×10^6 .d ☐

If the value for the equilibrium constant is much greater than 1, then the equilibrium _____ mixture contains mostly

✓ products .a ☒

reactants .b ☐

الإجابة الصحيحة هي:

products

The equilibrium-constant for the reaction
 $\text{Ti (s)} + 2\text{Cl}_2 \text{ (g)} \rightleftharpoons \text{TiCl}_4 \text{ (l)}$ is

✓ $[\text{Cl}_2]^{-2}$.a ☒

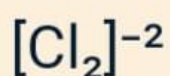
$[\text{Ti}][\text{Cl}_2]^2 / [\text{TiCl}_4]$.b ☐

$[\text{TiCl}_4] / [\text{Ti}] + [\text{Cl}_2]$.c ☐

$[\text{TiCl}_4] / [\text{Cl}_2]^2$.d ☐

$[\text{TiCl}_4] / [\text{Ti}][\text{Cl}_2]^2$.e ☐

الإجابة الصحيحة هي:



At 445°C, K_c for the following reaction is .0.020



A mixture of H_2 , I_2 , and HI in a vessel at 445°C has the following concentrations: $[\text{HI}] = 2.0 \text{ M}$, $[\text{H}_2] = 0.50 \text{ M}$ and $[\text{I}_2] = 0.10 \text{ M}$. Which one of the following statements concerning the reaction quotient, Q_c , is **TRUE** for the above system

Q_c is less than K_c ; more HI will be produced. .a ☐

$Q_c = K_c$; the system is at equilibrium .b ☐

Q_c is greater than K_c ; more H_2 and I_2 will be produced. .c ☐

✓ Q_c is less than K_c ; more H_2 and I_2 will be produced. .d ☒

Consider the equation:



An equilibrium mixture is analyzed and $[X]$ is $0.030M$, $[Y] = 0.500M$ and $[Z] = 0.600M$

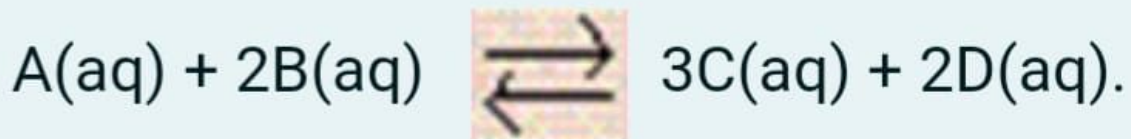
Calculate the value of K_{eq} for this reaction.

- a. ☐ 32
- b. ☐ 320
- c. ☒ 3200
- d. ☐ 32000

الإجابة الصحيحة هي:

3200

Given the equation



45.0 mL of 0.050 M A is mixed with 25.0 mL 0.100 M B. At equilibrium the concentration of C is 0.0410 M. Calculate K.

0.34 .a ☐

7.3 .b ☐

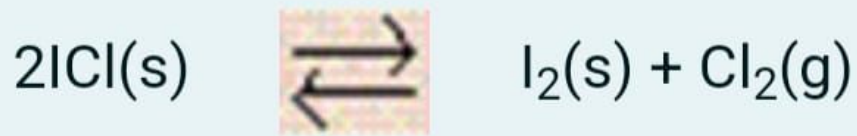
✓ 0.040 .c ☒

0.14 .d ☐

الإجابة الصحيحة هي:

0.040

:Consider the equilibrium system



Which of the following changes will increase the total amount of Cl_2 that can be produced

- a ☐ adding some of the $\text{I}_2\text{(s)}$
- b ☐ removing more ICl(s)
- c ☒ removing the Cl_2 as it is formed
- d ☐ decreasing the volume of the container

الإجابة الصحيحة هي:

removing the Cl_2 as it is formed

Which is the correct equilibrium-constant
expression for this reaction



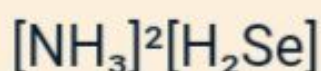
a. $[\text{NH}_4)_2\text{Se}] / [\text{NH}_3]^2[\text{H}_2\text{Se}]$ ☐

b. ☒ $[\text{NH}_3]^2[\text{H}_2\text{Se}]$

c. $1 / [\text{NH}_4)_2\text{Se}]$ ☐

d. $[\text{NH}_3] [\text{H}_2\text{Se}] / [\text{NH}_4)_2\text{Se}]$ ☐

الإجابة الصحيحة هي:



Consider the following reaction at equilibrium:



Le Chatelier's principle predicts that the moles of H_2 in the reaction container will increase with _____

a. ☐ some removal of NH_3 from the reaction vessel (V and T constant)

b. ☐ an increase in total pressure by the addition of helium gas (V and T constant)

c. ☒ a decrease in the total pressure (T constant)

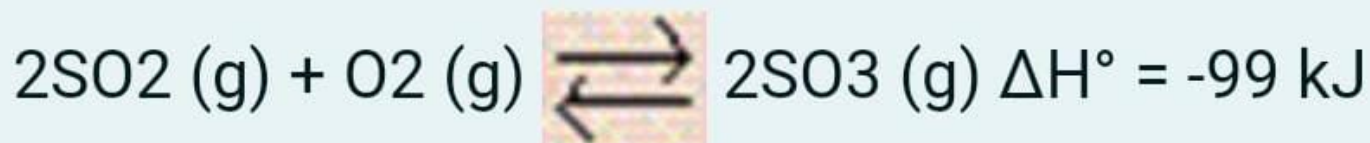
d. ☐ a decrease in the total volume of the reaction vessel (T constant)

e. ☐ addition of some N_2 to the reaction vessel (V and T constant)

الإجابة الصحيحة هي:

a decrease in the total pressure (T constant)

Consider the following reaction at equilibrium:



Le Chatelier's principle predicts that an increase in temperature will result in _____.

- a ☐ the partial pressure of O_2 will decrease
- b ☐ an increase in K_{eq}
- c ☐ a decrease in the partial pressure of SO_2
- d ☒ a decrease in the partial pressure of SO_3

الإجابة الصحيحة هي:

a decrease in the partial pressure of SO_3

Consider the following formula: $2\text{SO}_2 (\text{g}) + \text{O}_2 (\text{g}) \rightleftharpoons 2\text{SO}_3 (\text{g})$ The equilibrium cannot be established when _____ is/are placed in a 1.0-L container

- a ☐ 0.25 mol SO_2 and 0.25 mol O_2
- b ☐ 0.50 mol O_2 and 0.50 mol SO_3
- c ☐ 0.25 mol SO_2 and 0.25 mol SO_3
- d ☒ 0.75 mol SO_2

الإجابة الصحيحة هي:

0.75 mol SO_2

سؤال 5

صحيح

درجة 1.00 من 1.00

علم هذا السؤال

For the reaction



the equilibrium pressures are

$$P(\text{NCl}_3) = 0.160 \text{ atm}$$

$$P(\text{N}_2) = 2.31 \text{ atm}$$

$$P(\text{Cl}_2) = 0.0565 \text{ atm}$$

Determine K_p for this reaction.

1.22 .a ☐

7.75 .b ☐

0.816 .c ☐

✓ 0.0163 .d ☒

الإجابة الصحيحة هي:

0.0163

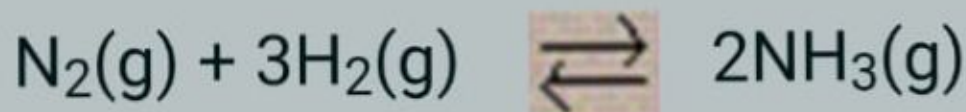
When a salt of weak acid and weak base is dissolved in water at 25°C , the pH of the resulting solution will always

- ☒ a. depend upon K_a and K_b values
- ☐ b. be less than 7
- ☐ c. be 7
- ☐ d. be greater than 7

الإجابة الصحيحة هي:

depend upon K_a and K_b values

Consider the following reversible reaction. In a 3.00 liter container, the following amounts are found in equilibrium at 400 °C: 0.0420 mole N₂, 0.516 mole H₂ and .0.0357 mole NH₃. Evaluate K_c



16.0 .a ☐

0.202 .b ☐

4.49 .c ☐

✓ 1.99 .d ☒

الإجابة الصحيحة هي:

1.99

The equilibrium-constant for the reaction
 $\text{Ti (s)} + 2\text{Cl}_2 \text{ (g)} \rightleftharpoons \text{TiCl}_4 \text{ (l)}$ is

a ☐ $[\text{TiCl}_4] / [\text{Ti}][\text{Cl}_2]^2$

b ☒ $[\text{Cl}_2]^{-2}$

c ☐ $[\text{TiCl}_4] / [\text{Ti}] + [\text{Cl}_2]$

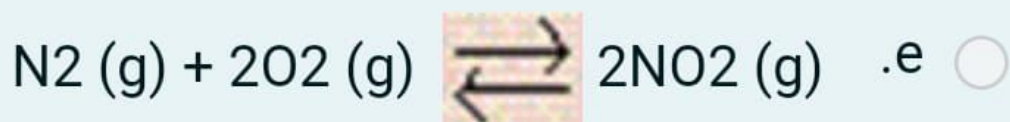
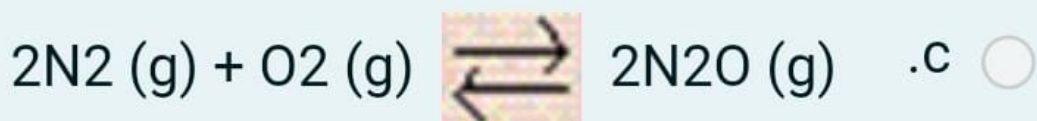
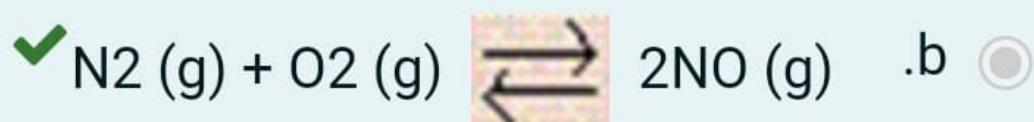
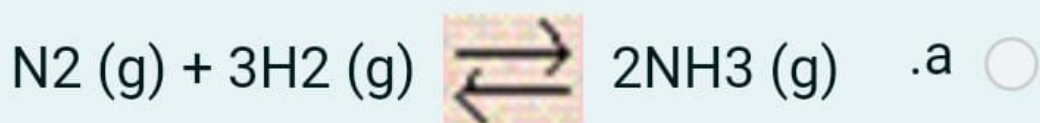
d ☐ $[\text{TiCl}_4] / [\text{Cl}_2]^2$

e ☐ $[\text{Ti}][\text{Cl}_2]^2 / [\text{TiCl}_4]$

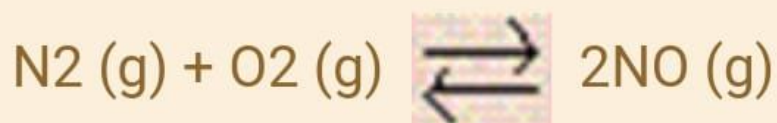
الإجابة الصحيحة هي:



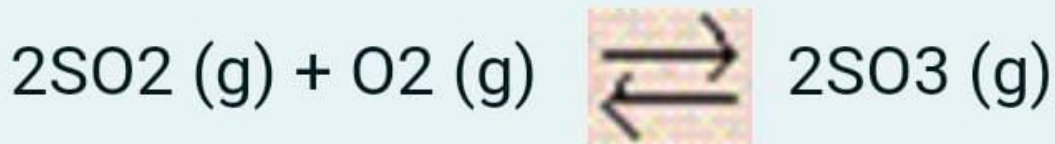
In which of the following reactions would increasing pressure at constant temperature not change the concentrations of reactants and products, based on Le Chatelier's principle?



الإجابة الصحيحة هي:



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.

- increasing the temperature .a ☐
- decreasing the pressure .b ☐
- ☒ increasing the volume of the container .c ☒
- increasing the pressure .d ☐
- removing some oxygen .e ☐

الإجابة الصحيحة هي:

increasing the pressure



The conventional equilibrium constant expression (K_c) for the system as described by the above equation is

☐ a. $[\text{SO}_2]^2/[\text{SO}_3]$

☒ b. $[\text{SO}_2]^2[\text{O}_2]/[\text{SO}_3]^2$

☐ c. $[\text{SO}_2][\text{O}_2]$

☐ d. $[\text{SO}_3]^2/[\text{SO}_3]^2[\text{O}_2]$

الإجابة الصحيحة هي:

$$[\text{SO}_2]^2[\text{O}_2]/[\text{SO}_3]^2$$

For a specific reaction, which of the following statements can be made about K , the equilibrium constant

It may be changed by the addition of a catalyst. .a ☐

It increases if the concentration of one of the products is increased. .b ☐

It always remains the same at different reaction conditions. .c ☐

It increases if the concentration of one of the reactants is increased. .d ☐

✓ It changes with changes in the temperature. .e ☒

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

✓ Q is the same as K_{eq} when a reaction is at equilibrium. .a ☒

K does not depend on the concentrations or partial pressures of reaction components. .b ☐

Q does not depend on the concentrations or partial pressures of reaction components. .c ☐

Q does not change with temperature. .d ☐

الإجابة الصحيحة هي:

Q is the same as K_{eq} when a reaction is at equilibrium.

The equilibrium constant for the gas phase reaction



is $K_{\text{eq}} = 230$ at 300°C .

At equilibrium, _____.

- a ☐ only reactants are present
- b ☐ reactants predominate
- c ☐ products predominate
- d ☒ roughly equal amounts of products and reactants are present
- e ☐ only products are present

الإجابة الصحيحة هي:

products predominate

Given the equation:



The equilibrium constant is 0.0150 at 115°C.

Calculate K_p .

1.41 x 10⁻⁴ .a ☐

0.0150 .b ☐

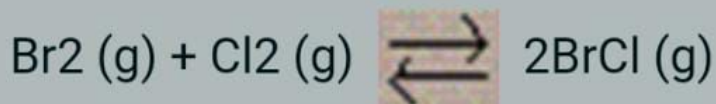
✓ 0.478 .c ☒

0.142 .d ☐

الإجابة الصحيحة هي:

0.478

At 400 K, the equilibrium constant for the reaction



is $K_p = 7.0$. A closed vessel at 400 K is charged with 1.00 atm of $\text{Br}_2(\text{g})$, 1.00 atm of $\text{Cl}_2(\text{g})$, and 2.00 atm of $\text{BrCl}(\text{g})$. Use Q to determine which of the statements below is true.

- a ☐ At equilibrium, the total pressure in the vessel will be less than the initial total pressure.
- b ☒ The equilibrium partial pressure of $\text{BrCl}(\text{g})$ will be greater than 2.00 atm.
- c ☐ The reaction will go to completion since there are equal amounts of Br_2 and Cl_2 .
- d ☐ The equilibrium partial pressure of Br_2 will be greater than 1.00 atm.

الإجابة الصحيحة هي:

The equilibrium partial pressure of $\text{BrCl}(\text{g})$ will be greater than 2.00 atm.

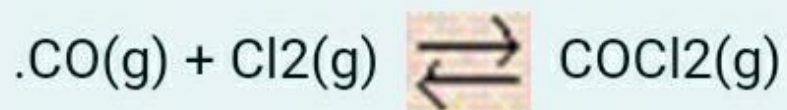
سؤال 4

صحيح

درجة 1.00 من 1.00

علم هذا السؤال

Consider the gaseous reaction



What is the expression for K_p in terms of K ?

a. $K/(\text{RT})^2$ ☐

b. $K(\text{RT})$ ☐

c. $K/(\text{RT})$ ☒

d. $K(\text{RT})^2$ ☐

الإجابة الصحيحة هي:

$K/(\text{RT})$

Consider the equation

$3A(g) \rightleftharpoons 2B(g) + C(g)$. At a particular temperature, $K = 1.6 \times 10^4$

Raising the pressure by lowering the volume of the container will

- ☒ a. have no effect.
- ☐ b. cause [A] to increase.
- ☐ c. cannot be determined
- ☐ d. cause [B] to increase.

الإجابة الصحيحة هي:

have no effect.

The equilibrium-constant expression depends on the _____ of the reaction.

the quantities of reactants and products initially present .a ☐

mechanism .b ☐

✓ stoichiometry .c ☒

stoichiometry and mechanism .d ☐

الإجابة الصحيحة هي:

stoichiometry

:Given the equilibrium equation



The value of K_{eq} for this reaction at 25 °C is 34.6

moles of A, B, C & D are all added to a 1.0 L container. Calculate the [B] at equilibrium

[B] = 0.0142 M .a ☐

✗ [B] = 0.142 M .b ☒

[B] = 0.058 M .c ☐

[B] = 0.58 M .d ☐

الإجابة الصحيحة هي:

[B] = 0.058 M

For the endothermic reaction



Le Chatelier's principle predicts that _____ will result in an increase in the number of moles of CO_2 .

removing some of the $\text{CaCO}_3 (\text{s})$.a ☐

increasing the temperature .b ☐

✗ decreasing the temperature .c ☒

increasing the pressure .d ☐

الإجابة الصحيحة هي:

increasing the temperature

Which of the following happens to the pH of
an acid when it is neutralised

The pH increases towards 7 .a ☐

✗ The pH does not change .b ☒

The pH decreases towards 7 .c ☐

الإجابة الصحيحة هي:

The pH increases towards 7

,When the system $A + B \rightleftharpoons C + D$ is at equilibrium

a. the forward reaction has stopped. ☐

b. both the forward and the reverse reactions have stopped. ☐

c. the sum of the concentrations of A and B must equal the sum of the concentrations of C and D. ☐

d. ☒ neither the forward nor the reverse reaction has stopped. ☐

الإجابة الصحيحة هي:

neither the forward nor the reverse reaction has stopped.

For the reaction given below, 2.00 moles of A and 3.00 moles of B are placed in a 6.00-L container.



At equilibrium, the concentration of A is 0.300 mol/L. What is the concentration of B at equilibrium?

0.300 mol/L .a ☐

✓ 0.433 mol/L .b ☒

0.500 mol/L .c ☐

0.600 mol/L .d ☐

الإجابة الصحيحة هي:

0.433 mol/L