BRITISH COLUMBIA CHEMISTRY 12 (MCH--12) · UNIT B · 25 QUESTIONS

Chemical Equilibrium — Practice Test

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

1 **At dynamic equilibrium in a closed system**



A all reactions stop

B the forward and reverse reactions continue at equal rates

C all reactants have been used up

D only the forward reaction continues

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2 **At equilibrium, the concentrations of reactants and products**

- **A** remain constant, though not necessarily equal
- **B** are always equal to each other
- **C** keep changing until the reaction stops
- **D** are always zero for the reactants

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3 **The equilibrium law expression for $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ is**

- **A** $K_eq = \frac{[HI]}{[H_2][I_2]}$
- **B** $K_eq = \frac{[H_2][I_2]}{[HI]^2}$
- **C** $K_eq = \frac{[HI]^2}{[H_2][I_2]}$
- **D** $K_eq = [HI]^2[H_2][I_2]$

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4 **The equilibrium law expression for $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ is**

A $K_eq = \frac{[NH_3]}{[N_2][H_2]}$

B $K_eq = \frac{[N_2][H_2]^3}{[NH_3]^2}$

C $K_eq = \frac{[NH_3]^2}{[N_2][H_2]}$

D $K_eq = \frac{[NH_3]^2}{[N_2][H_2]^3}$

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5 **For $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$, the equilibrium expression is**



A $K_eq = [CaO][CO_2]$

B $K_eq = \frac{[CaO][CO_2]}{[CaCO_3]}$

C $K_eq = [CO_2]$

D $K_eq = \frac{1}{[CO_2]}$

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6 **At equilibrium, $[H_2] = 0.10$, $[I_2] = 0.10$, and $[HI] = 0.40$, all in mol/L, for $H_2 + I_2 \rightleftharpoons 2HI$. K_eq is**

A 4

B 16

C 40

D 160

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7 **At equilibrium, $[N_2] = 0.25$, $[H_2] = 0.50$, and $[NH_3] = 0.50$, all in mol/L, for $N_2 + 3H_2 \rightleftharpoons 2NH_3$. K_eq is**

A 8

B 2

C 4

D 16

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8 **At equilibrium, $[CO] = 0.20$, $[H_2O] = 0.20$, $[CO_2] = 0.40$, and $[H_2] = 0.40$, all in mol/L, for CO + $H_2O \rightleftharpoons CO_2 + H_2$. The value of K_eq is**

- A 1
- B 2
- C 8
- D 4

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9 **A large K_eq value means that at equilibrium**

- A reactants are favoured over products
- B products are favoured over reactants
- C the reaction is very slow
- D no products have formed

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10 **A very small K_eq value means that at equilibrium**

- **A** products are favoured over reactants
- **B** the forward and reverse rates are zero
- **C** reactants are favoured over products
- **D** the reaction cannot be reversed

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11 **For A ⇌ B, an ICE table starts with [A] = 1.00 mol/L and [B] = 0. At equilibrium [B] = 0.20 mol/L. The equilibrium concentration of A, in mol/L, is**

- **A** 0.20
- **B** 0.40
- **C** 1.20
- **D** 0.80

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12 For A ⇌ B, with [A] falling from 1.00 to 0.80 mol/L, and [B] starting at 0, the value of K_eq is

- A 0.25
- B 0.20
- C 0.80
- D 4.0

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13 For $H_2 + I_2 \rightleftharpoons 2HI$, both reactants start at 0.50 mol/L. At equilibrium [HI] = 0.60 mol/L. The equilibrium [H_2], in mol/L, is

- A 0.10
- B 0.30
- C 0.40
- D 0.20

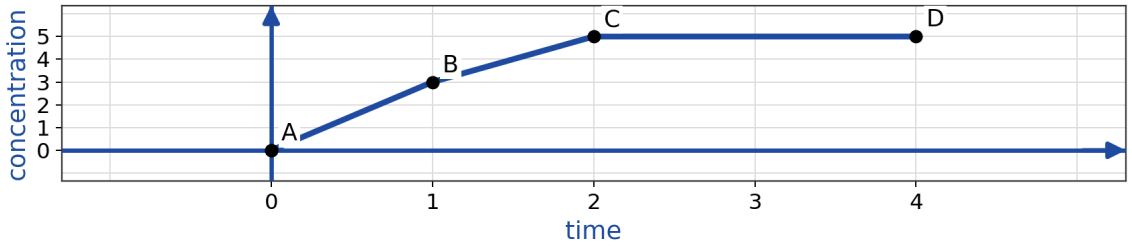
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14 **For the system in the previous type of ICE problem, with $[H_2] = 0.20$, $[I_2] = 0.20$, and $[HI] = 0.60$, all in mol/L, K_eq is**

- **A** 3
- **B** 6
- **C** 9
- **D** 15

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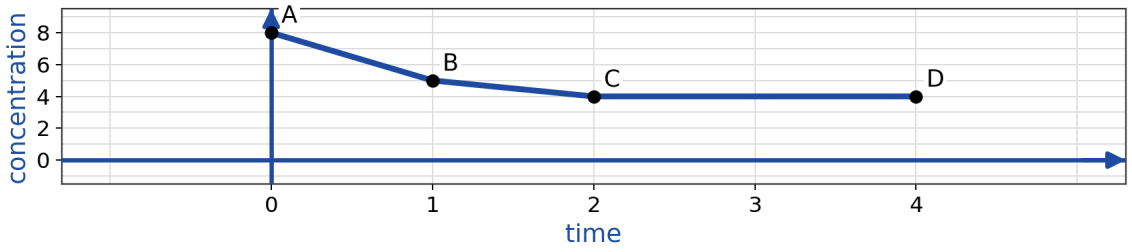
15 **The graph shows the concentration of a product against time. Points are (0, 0), (1, 3), (2, 5), and (4, 5). Equilibrium is first reached at about**



- **A** 1 minute
- **B** 2 minutes
- **C** 4 minutes
- **D** 0 minutes

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16 **The graph shows the concentration of a reactant against time. Points are (0, 8), (1, 5), (2, 4), and (4, 4). The flat section of the graph shows that**



A equilibrium has been reached

B the reaction has stopped completely

C all reactant has been used up

D the temperature has fallen to zero

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17 **For $N_2 + 3H_2 \rightleftharpoons 2NH_3$ + heat, adding more N_2 at equilibrium will shift the equilibrium to the**

A right, forming more NH_3

B left, forming more N_2

C right, forming more H_2

D left, with no change in NH_3

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18 **For $N_2 + 3H_2 \rightleftharpoons 2NH_3$ + heat, removing NH_3 at equilibrium will shift the equilibrium to the**

A left, to use up H_2

B right, to use up NH_3

C right, to replace the NH_3 removed

D left, with no change

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19 **For the exothermic reaction N_2 + $3H_2 \rightleftharpoons 2NH_3$ + heat, raising the temperature will shift the equilibrium to the**



A right, favouring the products

B left, favouring the reactants

C left, favouring the products

D right, with no change in K_eq

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20 **For the endothermic reaction N_2 + O_2 + heat ⇌ 2NO, raising the temperature will shift the equilibrium to the**



A left, favouring the reactants

B right, favouring the reactants

C left, with no change in K_eq

D right, favouring the products

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21

For $N_2 + 3H_2 \rightleftharpoons 2NH_3$, increasing the pressure by decreasing volume will shift the equilibrium toward the side with



A more moles of gas, the reactant side

B fewer moles of gas, the reactant side

C fewer moles of gas, the product side

D more moles of gas, the product side

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22 **For $H_2 + I_2 \rightleftharpoons 2HI$, changing the pressure will**

A not shift the equilibrium, since gas moles are equal on both sides

B shift it to the right

C shift it to the left

D change K_eq but not the position

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23 **Adding a catalyst to a system at equilibrium will**

A shift the equilibrium to the right

B shift the equilibrium to the left

C increase K_eq

D not change the equilibrium position or K_eq

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24 **Which change alters the value of K_eq for a reaction**



A a change in concentration

B a change in temperature

C a change in pressure

D adding a catalyst

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25

If Q is less than K_eq, the reaction will proceed to the

A left, forming more reactants

B right, forming more products

C right, forming more reactants

D left, until Q falls to zero

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ANSWER KEY

1.	B	**10.**	C	**19.**	B
2.	A	**11.**	D	**20.**	D
3.	C	**12.**	A	**21.**	C
4.	D	**13.**	D	**22.**	A
5.	C	**14.**	C	**23.**	D
6.	B	**15.**	B	**24.**	B
7.	A	**16.**	A	**25.**	B
8.	D	**17.**	A		
9.	B	**18.**	C		

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