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Chemistry_Questions_0062

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1. **015 Chapter #001**

During a chemical reaction, what defines when the concentrations of the reactants and products reach a constant level?

Student
Response

- a. elementary process
- b. reversible reaction
- c. rate law
- d. rate constant
- e. equilibrium

Score: 10/10

2. **015 Chapter #053**

At 400°C, $K_c = 64$ for the equilibrium $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$. If 3.00 mol H_2 and 3.00 mol I_2 are introduced into an empty 4.0 L vessel, find the equilibrium concentration of HI at 400°C.

Student
Response

- a. 0.15 M
- b. 1.2 M
- c. 2.4 M
- d. 4.8 M
- e. 5.8 M

3. **015 Chapter #060**

For the common allotropes of carbon (graphite and diamond), $\text{C}(\text{gr}) \rightleftharpoons \text{C}(\text{dia})$ with equilibrium constant $K = 0.32$. The molar volumes of graphite and diamond are,

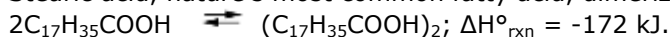
respectively, $5.30 \text{ cm}^3/\text{mol}$ and $3.42 \text{ cm}^3/\text{mol}$; ΔH_f of diamond is 1.90 kJ/mol . These data suggest that the formation of diamond is favored at:

Student Response

- a. low temperatures and low pressures.
- b. high temperatures and low pressures.
- c. low temperatures and high pressures.
- d. high temperatures and high pressures.
- e. None of these choices is correct.

4. **015 Chapter #040**

Stearic acid, nature's most common fatty acid, dimerizes when dissolved in hexane:



The equilibrium constant for this reaction at 28°C is 2900. Estimate the equilibrium constant at 38°C ($R = 8.314 \text{ J/mol K}$).

Student Response

- a. 4.7×10^5
- b. 2.6×10^4
- c. 1.9×10^3
- d. 3.2×10^2
- e. 18

5. **015 Chapter #030**

For the reaction $\text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons \text{PCl}_5(\text{g})$ at a particular temperature, $K_c = 32.4$. Suppose a system at that temperature is prepared with:

$[\text{PCl}_5] = 0.50 \text{ M}$, $[\text{Cl}_2] = 0.4 \text{ M}$, and $[\text{PCl}_3] = 0.10 \text{ M}$. Which of the following is correct?

Student Response

- a. The reaction will proceed in the direction of forming more PCl_5 and Cl_2 until equilibrium is reached.
- b. The reaction is at equilibrium.
- c. The reaction will proceed in the direction of forming more PCl_5 until equilibrium is reached.
- d. The reaction will proceed in the direction of forming more PCl_3 and Cl_2 until

equilibrium is reached.

e. None of these choices is correct.

6. 015 Chapter #010

Calculate K_c for the reaction $2\text{HI}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{I}_2(\text{g})$ given that the concentrations of each species at equilibrium are as follows: $[\text{HI}] = 0.85 \text{ mol/L}$, $[\text{I}_2] = 0.60 \text{ mol/L}$, $[\text{H}_2] = 0.27 \text{ mol/L}$.

Student Response

a. 5.25

b. 0.22

c. 4.5

d. 0.19

e. 1.6×10^2

7. 015 Chapter #080

The equilibrium constant expression for the reaction $\text{CuO}(\text{s}) + \text{H}_2(\text{g}) \rightleftharpoons \text{Cu}(\text{s}) + \text{H}_2\text{O}(\text{g})$ is $K_c = [\text{H}_2]/[\text{H}_2\text{O}]$.

Student Response

a. TRUE

b. FALSE

8. 015 Chapter #020

Nitric oxide and bromine were allowed to react in a sealed container. When equilibrium was reached, the following partial pressures of three gases were measured: NO: 0.526 atm; Br_2 : 1.59 atm; NOBr: 7.68 atm.

Calculate K_p for the reaction $2\text{NO}(\text{g}) + \text{Br}_2(\text{g}) \rightleftharpoons 2\text{NOBr}(\text{g})$.

Student Response

a. 7.45×10^{-3}

b. 0.109

c. 9.18

d. 91.8

e. 134

9. **015 Chapter #047**

At 250°C, the equilibrium constant K_p for the reaction $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$ is 1.80. Sufficient PCl_5 is put into a reaction vessel to give an initial pressure of 2.74 atm at 250°C. Calculate the pressure of PCl_5 after the system has reached equilibrium.

Student
Response

a. 1.50 atm

b. 1.24 atm

c. 4.24 atm

d. 0.94 atm

e. 1.12 atm

10. **015 Chapter #070**

75.0 g of $\text{PCl}_5(\text{g})$ is introduced into an evacuated 3.00 L vessel and allowed to reach equilibrium at 250°C. $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$ If $K_p = 1.80$ for this reaction, what is the total pressure inside the vessel at equilibrium ($R = 0.0821 \text{ atm L/ mol K}$)?

Student
Response

a. 2.88 atm

b. 2.27 atm

c. 4.54 atm

d. 7.42 atm

e. 9.69 atm