

LECTURE 19

1. At $T = 100^\circ\text{C}$, the reaction shown below has an equilibrium constant $K = 2.75$.

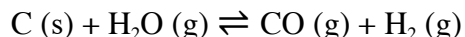


Suppose the partial pressure of $\text{SO}_2\text{Cl}_2(\text{g})$ is 2.15 bar, $\text{SO}_2(\text{g})$ is 0 bar, and $\text{Cl}_2(\text{g})$ is 0 bar.

- (a) Calculate the reaction quotient Q and state whether the reaction proceeds to the right or the left as equilibrium is approached.
(b) Calculate the partial pressures of each species at equilibrium.
(c) If the volume of the system is increased, will there be net formation or net dissociation of SO_2Cl_2 ?

- (a) The reaction quotient is 0 so the reaction will proceed to towards the products (to the right) to reach equilibrium.**
(b) The partial pressure of SO_2 and Cl_2 are 1.42 bar and for SO_2Cl_2 it is 0.73 bar.
(c) There will be a net dissociation of SO_2Cl_2 .

2. The formation of carbon monoxide from coal is shown by the equation:

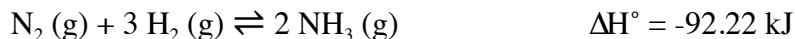


What happens to:

- (a) $[\text{H}_2]$ if H_2O is added?
(b) $[\text{CO}]$ if H_2 is removed?
(c) $[\text{H}_2]$ if CO is added?
(d) $[\text{CO}]$ if C is added?

- (a) $[\text{H}_2]$ increases.**
(b) $[\text{CO}]$ increases.
(c) $[\text{H}_2]$ decreases.
(d) $[\text{CO}]$ does not change.

3. The formation of ammonia from nitrogen and hydrogen occurs by the following equation:



Does the amount of ammonia produced increase, decrease, or remain the same when a mixture of reactants and products at equilibrium undergoes the following changes?

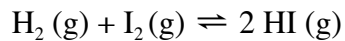
- (a) The temperature decreases
(b) The volume is increased
(c) Argon is added
(d) N_2 is added

- (a) Increases.**
(b) Decreases.
(c) No change.
(d) Increases.

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4. A mixture of 0.22 mol H₂ and 0.55 mol I₂ in a 100.0-mL container was heated to 700.0K and allowed to reach equilibrium. Will more HI be formed if that equilibrium mixture is cooled to 298.0K?

For the reaction



K = 54 at 700.0K and 794 at 298.0K.

Yes. There will be a higher ratio of product (HI) to reactants at the lower temperature than at the higher temperature.

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5.111 Principles of Chemical Science
Fall 2014

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