

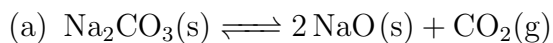
## Chapter 12 – Problems 6, 16, 18, 22

Michael Brodskiy

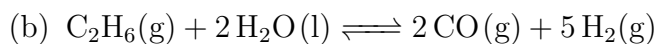
Instructor: Mr. Morgan

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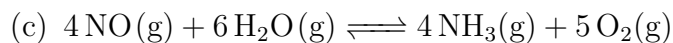
6. Write equilibrium constant ( $k$ ) expressions for the following reactions:



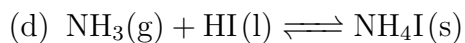
$$k = [P_{\text{CO}_2}] \quad (1)$$



$$k = \left[ \frac{(P_{\text{CO}})^2 (P_{\text{H}_2})^5}{P_{\text{C}_2\text{H}_6}} \right] \quad (2)$$

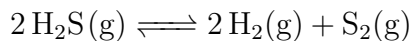


$$k = \left[ \frac{(P_{\text{O}_2})^5 (P_{\text{NH}_3})^4}{(P_{\text{NO}})^4 (P_{\text{H}_2\text{O}})^6} \right] \quad (3)$$



$$k = \left[ \frac{1}{(P_{\text{NH}_3})} \right] \quad (4)$$

16. At  $800[^\circ \text{C}]$ ,  $k = 2.2 \cdot 10^{-4}$  for the following reaction. Calculate  $k$  at  $800[^\circ \text{C}]$  for:



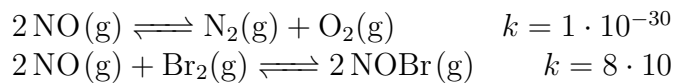
(a) the synthesis of one mole of  $\text{H}_2\text{S}$  from  $\text{H}_2$  and  $\text{S}_2$  gases.

$$\begin{aligned} k_i &= \frac{1}{k_f} \\ k_i &= k_f^{\frac{1}{2}} \\ k &= \frac{1}{k^{\frac{1}{2}}} \\ &= 67.42 \end{aligned} \quad (5)$$

(b) the decomposition of one mole of  $\text{H}_2\text{S}$  gas

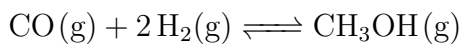
$$\begin{aligned} k_i &= k^{\frac{1}{2}} \\ (2.2 \cdot 10^{-4})^{.5} &= .015 \end{aligned} \tag{6}$$

18. Given the following data at  $25[^\circ \text{C}]$ , calculate  $k$  for the formation of one mole of  $\text{NOBr}$  from its elements in the gaseous state



$$\begin{aligned} k_1 &= \left( \frac{1}{10^{-30}} \right)^{(.5)} \\ k_1 &= 10^{15} \\ k_2 &= \sqrt{80} \\ k_2 &= 8.94 \\ k_{total} &= 8.94 \cdot 10^{15} \end{aligned} \tag{7}$$

22. Calculate  $k$  for the formation of methyl alcohol at  $100[^\circ \text{C}]$ , given that at equilibrium, the partial pressures of the gases are  $P_{\text{CO}} = .814[\text{ATM}]$ ,  $P_{\text{H}_2} = .274[\text{ATM}]$ , and  $P_{\text{CH}_3\text{OH}} = .0512[\text{ATM}]$



$$\begin{aligned} k &= \frac{.0512}{.814 \cdot (.274)^2} \\ k &= .838 \end{aligned} \tag{8}$$