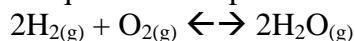
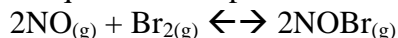


Equilibrium Constant Expression problems

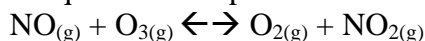
1. Write the equilibrium expression for the oxidation of hydrogen to form water vapor.



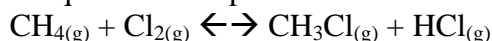
2. Write the equilibrium expression for the formation of nitrosyl bromide.



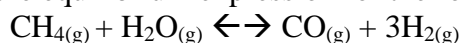
3. Write the equilibrium expression for the following reaction.



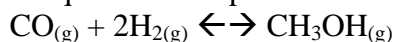
4. Write the equilibrium expression for the following reaction.



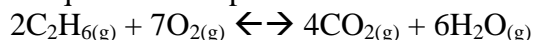
5. Write the equilibrium expression for the following reaction.



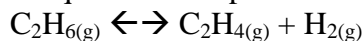
6. Write the equilibrium expression for the following reaction.



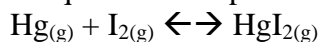
7. Write the equilibrium expression for the combustion of ethane at high temperature.



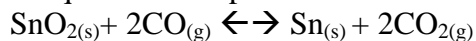
8. Write the equilibrium expression for the decomposition of ethane.



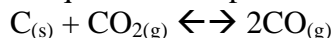
9. Write the equilibrium expression for the following reaction.



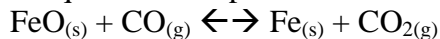
10. Write the equilibrium expression for the following reaction.



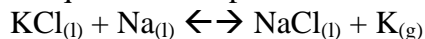
11. Write the equilibrium expression for the following reaction.



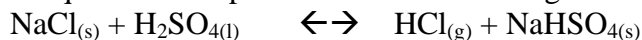
12. Write the equilibrium expression for the following reaction.



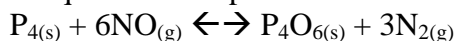
13. Write the equilibrium expression for the following reaction.



14. Write the equilibrium expression for the following reaction.



15. Write the equilibrium expression for the following reaction.



16. Write the equilibrium expression for the following reaction.
$$2\text{NO}_{(g)} + 2\text{H}_2_{(g)} \rightleftharpoons \text{N}_{2(g)} + 2\text{H}_2\text{O}_{(l)}$$
17. Write the equilibrium expression for the following reaction.
$$\text{H}_2\text{CO}_{3(s)} \rightleftharpoons \text{H}_2\text{O}_{(l)} + \text{CO}_{2(g)}$$
18. Write the equilibrium expression for the following reaction.
$$\text{CO}_{2(g)} + \text{H}_2_{(g)} \rightleftharpoons \text{CO}_{(g)} + \text{H}_2\text{O}_{(l)}$$
19. At 740°C the decomposition of calcium carbonate (CaCO_3) is described by the equation $\text{CaCO}_{3(s)} \rightleftharpoons \text{CaO}_{(s)} + \text{CO}_{2(g)}$. $K_{\text{eq}} = 0.0060$ for this temperature. Find Q and predict how the reaction will proceed if $[\text{CO}_2] = 0.0004 \text{ M}$.
20. For the reaction $\text{CO}_{(g)} + \text{H}_2\text{O}_{(g)} \rightleftharpoons \text{H}_2_{(g)} + \text{CO}_{2(g)}$, $K_{\text{eq}} = 5.10$ at 527°C. If $[\text{CO}] = 0.15 \text{ M}$, $[\text{H}_2\text{O}] = 0.25 \text{ M}$, $[\text{H}_2] = 0.42 \text{ M}$, and $[\text{CO}_2] = 0.37 \text{ M}$, calculate Q and determine how the reaction will proceed.
21. At 340°C, $K_{\text{eq}} = 0.060$ for the reaction $\text{Fe}_2\text{O}_{3(s)} + 3\text{H}_2_{(g)} \rightleftharpoons 2\text{Fe}_{(s)} + 3\text{H}_2\text{O}_{(g)}$. Given that $[\text{H}_2] = 0.45$ and $[\text{H}_2\text{O}] = 0.37$, find Q and predict how the reaction will proceed.
22. At 2130°C, $K_{\text{eq}} = 0.0025$ for the reaction $\text{N}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{NO}_{(g)}$. If $[\text{N}_2] = 0.81$, $[\text{O}_2] = 0.75 \text{ M}$, and $[\text{NO}] = 0.030 \text{ M}$, find Q and determine the direction in which the reaction will proceed.

23. Ammonia is synthesized from nitrogen and hydrogen in the reaction $\text{N}_{2(\text{g})} + 3\text{H}_{2(\text{g})} \rightleftharpoons 2\text{NH}_{3(\text{g})}$. At 500°C , the equilibrium constant for this reaction is 0.080. Given that $[\text{NH}_3] = 0.0596$, $[\text{N}_2] = 0.600$, and $[\text{H}_2] = 0.420$, find Q and predict how the reaction will proceed.
24. The decomposition of antimony pentachloride (SbCl_5) is described by the equation $\text{SbCl}_{5(\text{g})} \rightleftharpoons \text{SbCl}_{3(\text{g})} + \text{Cl}_{2(\text{g})}$. At 448°C , the equilibrium constant for this reaction is 0.0251. What is the value of Q if $[\text{SbCl}_5] = 0.095$, $[\text{SbCl}_3] = 0.020$, and $[\text{Cl}_2] = 0.050$? How will this reaction proceed?
25. At 1000°C , $K_{\text{eq}} = 1.0 \times 10^{-13}$ for the decomposition of hydrofluoric acid (HF), as described in the reaction $2\text{HF}_{(\text{g})} \rightleftharpoons \text{H}_{2(\text{g})} + \text{F}_{2(\text{g})}$. If $[\text{HF}] = 23.0$, $[\text{H}_2] = 0.540$, and $[\text{F}_2] = 0.380$, determine the value of Q and predict how the reaction will proceed.
26. At 1227°C , K_{eq} for the following reaction, $2\text{SO}_{2(\text{g})} + \text{O}_{2(\text{g})} \rightleftharpoons 2\text{SO}_{3(\text{g})}$, is 0.15. If $[\text{SO}_2] = 0.344 \text{ M}$, $[\text{O}_2] = 0.172 \text{ M}$, and $[\text{SO}_3] = 0.056 \text{ M}$, find Q and determine how the reaction will proceed.