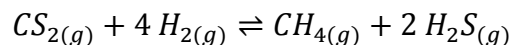


Exercise 7.4

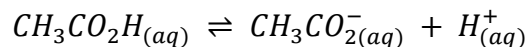
Standard Free Energies and Equilibrium Constants

1. In Exercise 7.3, you calculated the standard free energy change for the following reaction:



Calculate the equilibrium constant for this reaction at 25 °C.

2. The equilibrium constant for the following reaction is 1.8×10^{-5} at 25 °C.



- (a) Calculate the standard free energy change for this reaction.
- (b) Given that the standard free energy of formation for acetic acid ($CH_3CO_2H_{(aq)}$) is $-396.46 \frac{kJ}{mol}$, calculate the standard free energy of formation for the acetate anion ($CH_3CO_2^{-}(aq)$).

3. The gas phase reaction of HCl with oxygen gives water vapour and chlorine. Calculate the equilibrium constant for this reaction at $25\text{ }^{\circ}\text{C}$.

4. When aqueous ammonia reacts with water, ammonium and hydroxide ions are produced. Calculate the equilibrium constant for this reaction at $25\text{ }^{\circ}\text{C}$.
(Yes, you could just look up the number. Don't do that! 😊)