CH1011 Tutorial 8

Name:

1. Identify the **acids** and the **bases** in the following processes.

 $HNO_3 + H_2O \rightleftharpoons H_3O^+ + NO_3^ NH_3 + H_2S \rightleftharpoons HS^- + NH_4^+$

2. Define a **Bronsted-Lowry acid** and give an example of a **weak** Bronsted-Lowry acid.

3. Calculate the **hydrogen ion concentration** $[H_3O]^+$, pH and pOH for a 0.200 M solution of HClO₄.

4. SO₂ is the gas that is most responsible for **acid rainfall** events in most regions where this effect is pronounced. Calculate the concentration of SO₂ inside a raindrop that is at equilibrium with air that contains a concentration of 200ppm SO₂. $K_H SO_2 = 1.470 \text{ mol dm}^{-3} \text{ atm}^{-1}$

5. **CFCs** are responsible for the depletion of stratospheric ozone globally. Detail the chemistry involved and why man has managed to influence a global chemical reservoir – the ozone layer.

$$\begin{aligned} & \text{Additional information:} \\ & \Delta G^{\circ}_{f}(H_{2}O(l) - 237.2 \text{ kJ/mol} & \Delta G^{\circ}_{f}(H_{2}O(g) - 228.6 \text{ kJ/mol} & - \text{ values of } \Delta G^{\circ}_{f} \text{ at } 298 \text{ K} \\ & \Delta G^{\circ} = -\text{RT ln K} & \text{R} = 8.31 \text{ J/mol K} & \text{T(K)} = \text{T(}^{\circ}\text{C}) + 273 \\ & \text{E}_{cell} = \text{E}^{\circ}_{cell} - \frac{\text{RT}}{nF} \ln \left(\frac{\left[C \right]^{c} \left[D \right]^{d}}{\left[A \right]^{a} \left[B \right]^{b}} \right) & \text{E}^{\circ}_{cell} = \text{E}^{\circ}_{Reduction} - \text{E}^{\circ}_{Oxidation} & \Delta G^{=} - \text{n F E} \end{aligned}$$