

Acid-Base Equilibria

Section 90 – Review - Ionic Compounds in Aqueous Solution

1. Identify the major species that would be present in aqueous solutions of each the following compounds.
 - (a) HI
 - (b) CsCl
 - (c) NH_4NO_3
 - (d) $\text{Sr}(\text{OH})_2$

Answer(s):

- (a) $\text{H}_2\text{O}(l)$, $\text{H}^+(aq)$, and $\text{I}^-(aq)$
- (b) $\text{H}_2\text{O}(l)$, $\text{Cs}^+(aq)$, and $\text{Cl}^-(aq)$
- (c) $\text{H}_2\text{O}(l)$, $\text{NH}_4^+(aq)$, and $\text{NO}_3^-(aq)$
- (d) $\text{H}_2\text{O}(l)$, $\text{Sr}^{2+}(aq)$, and $\text{OH}^-(aq)$

2. Determine the concentrations of all major species in the aqueous solutions indicated below. (You can ignore the solvent, water, which would be present at a relatively constant 55.5 M).
 - (a) 0.100 M HI
 - (b) 0.050 M CsCl
 - (c) 0.020 M NH_4NO_3
 - (d) 0.200 M $\text{Sr}(\text{OH})_2$

Answer(s):

- (a) Since HI is fully dissociated in aqueous solution, and the stoichiometry is such that there is 1 mol of H^+ per mol of HI; and 1 mol of I^- per mol of HI, the concentration of each of H^+ and I^- is equal to the original concentration of HI (0.100 M). Thus, there is 0.100 M $\text{H}^+(aq)$ and 0.100 M $\text{I}^-(aq)$
- (b) By the same reasoning above, the concentrations would be 0.050 M $\text{Cs}^+(aq)$ and 0.050 M $\text{Cl}^-(aq)$
- (c) By the same reasoning above, the concentrations would be 0.020 M $\text{NH}_4^+(aq)$ and 0.020 M $\text{NO}_3^-(aq)$
- (d) Note that in this case, the stoichiometry is such that there are TWO moles of hydroxide for every mole of Sr^{2+} . Thus, if the concentration is 0.200 M, there is 0.200 M $\text{Sr}^{2+}(aq)$ and 0.400 M $\text{OH}^-(aq)$.