8.3 Salts and Equilibrium

Previous Knowledge

Strong acids/bases do not form equilibrium situations
(the conjugate acid/base does not form the original strong acid)

$$HCl \rightarrow H^+ + Cl^- \qquad H^+ + Cl^- \rightarrow \text{No reaction}$$

So sodium ions and chloride ions do not produce sodium hydroxide or hydrochloric acid

$$Na^+ + H_2O \rightarrow \text{ No reaction} \qquad Cl^- + H_2O \rightarrow \text{No reaction}$$

Weak acids/bases do form equilibrium situations
(Weak acids form conjugate bases and weak base form conjugate acids)

$$HCN + H_2O \leftrightarrow H_3O^+ + CN^-$$

$$HCN + H_2O \rightarrow H_3O^+ + CN^- \qquad H_3O^+ + CN^- \rightarrow HCN + H_2O$$

If the [weak acid] was to decrease then the equilibrium would shift to the left - the conjugate acid/base would form some of the weak acid/base

$$HCN \leftrightarrow H_3O^+ + CN^-$$

New Knowledge
Water is amphiprotic. It can behave like an acid or a base.
Therefore if the conjugate acids/bases was placed in water it would form the original weak acid/base.

$$CN^- + H_2O \rightarrow HCN + OH^-$$

So conjugate acids/bases actually behave like acids/bases

Therefore, if an ionic compound was made up of one of these conjugate acids/bases, then that ionic compound would behave like an acid/base

NaCN is an ionic compound but it behave like a base because it has the conjugate base of HCN

NH_4Cl is an ionic compound but it behaves like an acid because it has the conjugate acid of NH_3