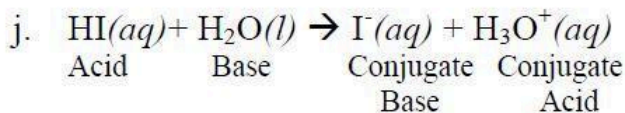
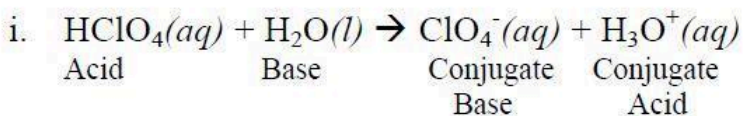
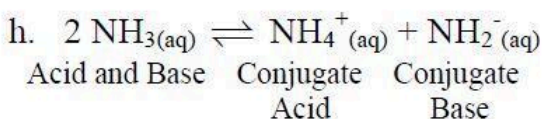
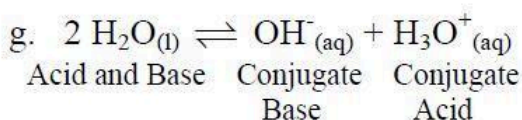
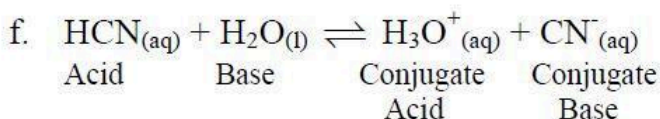
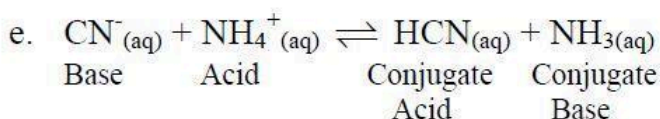
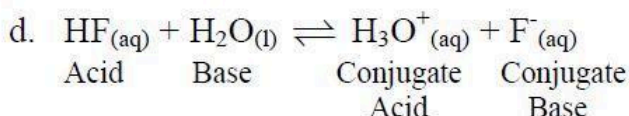
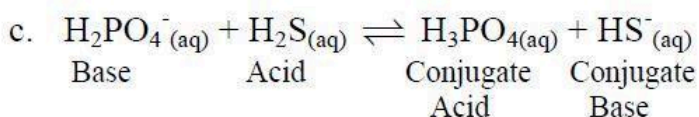
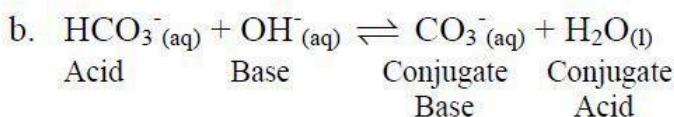
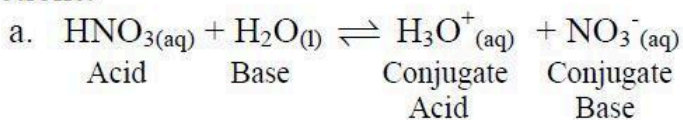
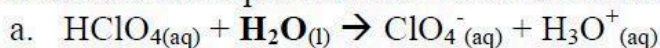


Chemical Reactions
4.8 Introduction to Acid-Base Reactions
Worksheet Key

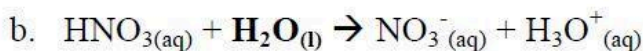
1) Label the acid, base, conjugate acid, and conjugate base in the following reactions.



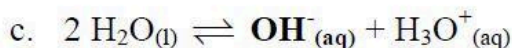
- 2) What is the strongest base in each the following reactions? Provide justification based on solution equilibrium or forces of attraction between particles.



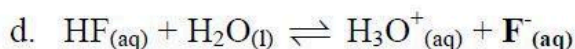
H₂O is the strongest base. Strong acids, such as HClO₄, experience ~100% dissociation and have weak conjugate bases. Thus, ClO₄⁻ is a weak base. H₂O and ClO₄⁻ compete for H⁺ ions. H₂O acquires the H⁺ ions most of the time, as the reaction goes to completion.



H₂O is the strongest base. Strong acids, such as HNO₃, experience ~100% dissociation and have weak conjugate bases. Thus, NO₃⁻ is a weak base. H₂O and NO₃⁻ compete for H⁺ ions. H₂O acquires the H⁺ ions most of the time, as the reaction goes to completion.

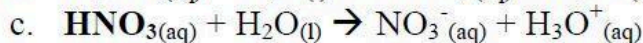
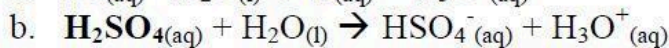
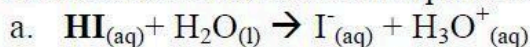


We know that the equilibrium for this reaction lies far to the left, as K_w is 1.0×10^{-14} . This means that **OH⁻ is a stronger base** than H₂O. OH⁻ and H₂O compete for H⁺ ions, and OH⁻ wins most of the time. This drives the equilibrium to the left.



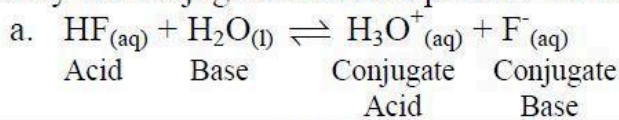
F⁻ is the stronger base. HF is a weak acid, and weak acids have strong conjugate bases. We also know that F⁻ is a relatively strong base, because it is very electronegative. Water has only moderate strength as a base, as it can act as an acid or a base.

- 3) What is the strongest acid in each of the following reactions? Provide justification based on solution equilibrium



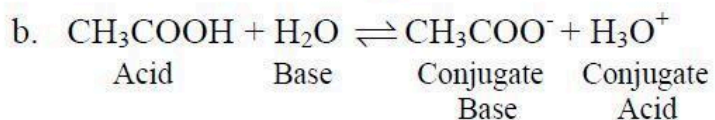
HI, H₂SO₄, and HNO₃ are all very strong acids. They are three of the 'Big Six' strong acids. As they experience ~100% dissociation, the equilibrium for these reactions lies very far to the right.

- 4) Identify the conjugate acid base pairs in the following reactions.

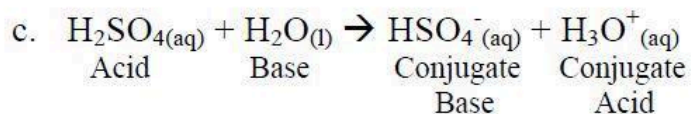


HF and F⁻ are a conjugate acid base pair.

H₂O and H₃O⁺ are a conjugate acid base pair.



CH_3COOH and CH_3COO^- are a conjugate acid base pair.
 H_2O and H_3O^+ are a conjugate acid base pair.



H_2SO_4 and HSO_4^- are a conjugate acid base pair.
 H_2O and H_3O^+ are a conjugate acid base pair.