

1) The Arrhenius definitions of acids and bases are somewhat limited because they can only describe acids and bases that have been dissolved in water. Thus, sometimes the Brønsted acid/base definitions are more useful because they can be used when acids and bases are in other liquids. Complete the Brønsted definitions below:

- a) A Brønsted acid (**donates, accepts**) a proton (H^+).
- b) A Brønsted base (**donates, accepts**) a proton (H^+).

2) Write the conjugate base for each of the following acids. [Remember, the an acid *loses one* H^+]

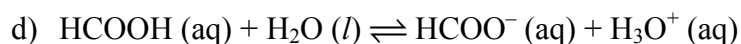
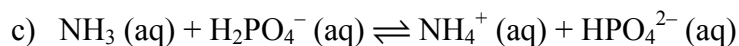
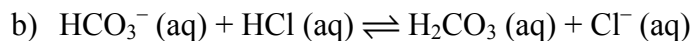
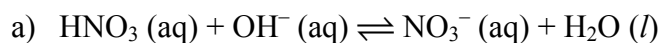
- a) HNO_3
- b) HS^-
- c) HPO_4^{2-}
- d) $HC_3H_5O_2$
- e) H_2SO_3
- f) C_6H_5COOH

3) Write the conjugate acid for each of the following bases. [Remember, the a base *gains one* H^+]

- a) HPO_4^{2-}
- b) NO_2^-
- c) NH_3
- d) HS^-
- e) S^{2-}
- f) C_5H_4N

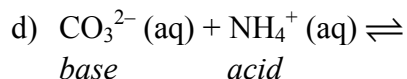
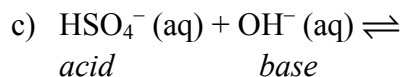
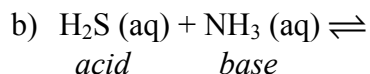
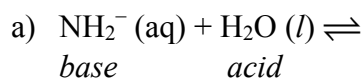
4) For the following reactions:

- draw an arrow showing the transfer of the H^+ between reactants (Look at the products—which way does the H^+ go?).
- Label the acid (A), the base (B), the conjugate acid (CA), and the conjugate base (CB).



5) For the following reactions:

- show the arrow for the transfer of H^+ between reactants (*Remember-- the acid always gives its H^+ to the base.*)
- determine the products of each reactions (Watch your charges!! *Losing/gaining H^+ only*)
- Label the conjugate acid (CA) and the conjugate base (CB)



6) Methylamine (CH_3NH_2 , Lewis structure below) forms hydroxide in water the same way that ammonia, NH_3 , does. Draw the transfer of H^+ from water ($H-OH$) and explain why methylamine is a Brønsted-Lowry base but not an Arrhenius base. [Hint: in the products, the N is tetrahedral with one additional H and a + charge, like NH_3 becoming NH_4^+ .]

