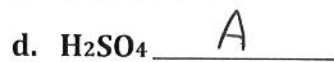
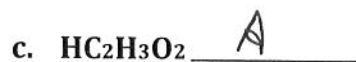
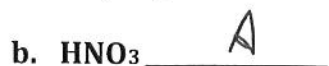
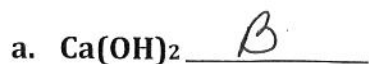
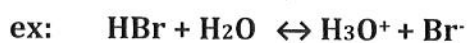


## Types of Acids and Bases

1. Classify these as an Arrhenius acid or Arrhenius base.



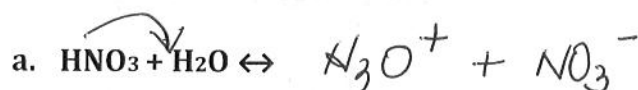
2. Complete the equations for the Ionization of these Arrhenius acids or bases in water:



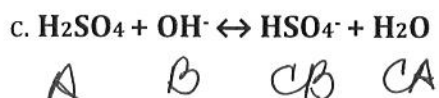
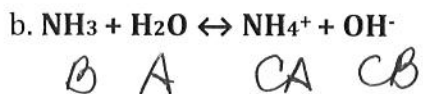
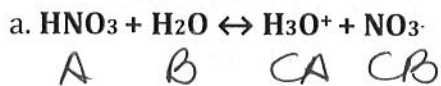
$$K_a = \frac{[\text{H}_3\text{O}^+][\text{Br}^-]}{[\text{HBr}]}$$

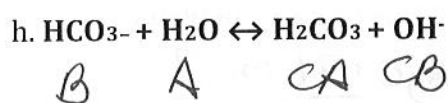
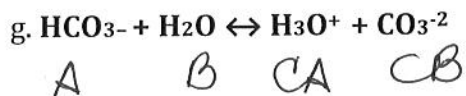
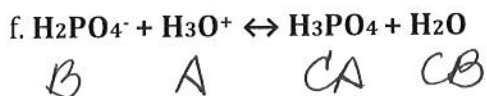
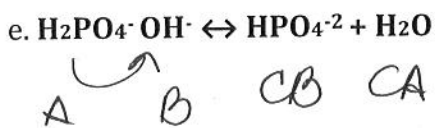
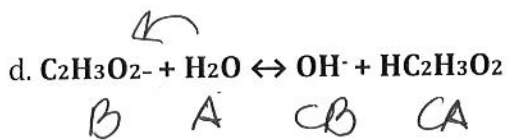


$$K_b = \frac{[\text{H}_3\text{O}^+][\text{K}^+]}{[\text{KOH}]}$$



3. Identify the Bronsted-Lowry acid (*loses* an  $\text{H}^+$  ion), base (*gains* an  $\text{H}^+$  ion), conjugate acid, and the conjugate base in each of the following:





4. What is the conjugate acid of the following: (particle made by adding an H<sup>+</sup> ion)



c.  $Cl^-$

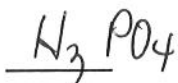


watch the charge!

d.  $HCO_3^-$



e.  $H_2PO_4^-$



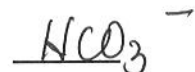
5. What is the conjugate base of the following: (particle made by removing an H<sup>+</sup> ion)

a.  $NH_4^+$

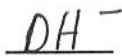


i.e. removing a  $p^+$

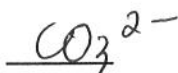
b.  $H_2CO_3$



c.  $H_2O$

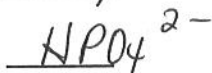


d.  $HCO_3^-$



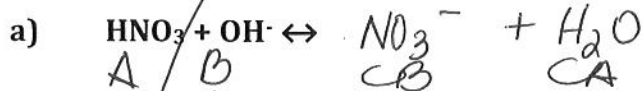
watch the charge on the ions

e.  $H_2PO_4^-$

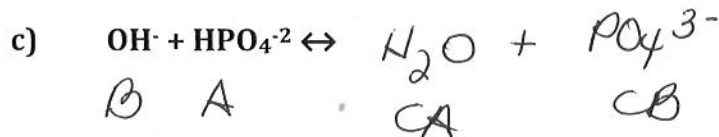
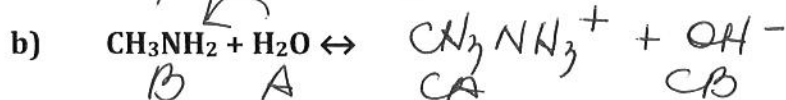


methylamine  $K_b = 4.4 \times 10^{-4}$

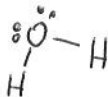
6. Using your knowledge of the Brønsted-Lowry theory of acids and bases, write equations for the following acid-base reactions and indicate each conjugate acid-base pair:



make sure charges before = charges after



7. In the following reactions, identify the Lewis acid and the Lewis base.



8. How do Lewis acids and bases compare to the Arrhenius and Brønsted-Lowry definitions of an acid and a base?

water must be involved

9. The compound NaOH is a base by all three of the theories we discussed in class.

However, each of the three theories describes what a base is in different terms.

Use your knowledge of these three theories to describe NaOH as an Arrhenius base, a Brønsted-Lowry base, and a Lewis base.

Arrhenius bec

(dissociates in water)  
 produces  $\text{OH}^-$  ions in water

Brønsted-Lowry bec

accepts a  $\text{H}^+$  ion from an A  
 (proton)

Lewis bec

bec it donates an  $e^-$  pair to an A