South Pasadena • AP Chemistry

Name _____
Period ___ Date ___/___/___

17 • The Chemistry of Acids & Bases

BRØNSTED-LOWRY ACIDS & BASES

The Arrhenius definition of an **acid** is a substance that increases the _____ or _____ in water solution.
The Arrhenius definition of a **base** is a substance that increases the _____ in water solution.

$HCl \rightarrow$

$HCl + H_2O \rightarrow$

$NH_3 + H_2O \leftrightarrows$

$HC_2H_3O_2 \leftrightarrows$

$HC_2H_3O_2 + H_2O \leftrightarrows$

$NaOH \rightarrow$

A hydrogen atom is made up of a _____ and a _____. A H^+ ion is a _____.

The Brønsted-Lowry definition of an **acid** is a substance that _____ _____.
The Brønsted-Lowry definition of a **base** is a substance that _____ _____.

$HC_2H_3O_2 + H_2O \leftrightarrows$

$NH_3 + H_2O \leftrightarrows$

$HCl + H_2O \rightarrow$

H_2O in the reactions above is an acid?__ a base? ___ both an acid and a base? ___
Arrhenius would not have called H_2O an acid or a base. Brønsted-Lowry says H_2O is amphiprotic.
Consider the reverse of the above reactions. Label the substances as acids and bases.

The Brønsted-Lowry definition is **broader** than the Arrhenius definition because it is not restricted to aqueous solutions and because it recognizes that a proton cannot be donated unless there is a substance available to accept it. Also, in different situations, a substance can be either a proton donor or a proton acceptor.

$NH_3(g) + HCl(g) \leftrightarrows$

HCl is a proton **donor**. Cl^- is a proton _____. HCl is an **acid**. Cl^- can act as a _____.
Cl^- is called the **conjugate base** of HCl.

$HC_2H_3O_2$ is an acid. What is its conjugate base? _____

H_2O can be an acid or a base! What is its conjugate base? _____ What is its conjugate acid? _____

NH_3 can be an acid or a base. What is its conjugate base? _____ What is its conjugate acid? _____

HSO_4^- can be an acid or a base. What is its conjugate base? _____ What is its conjugate acid? _____

With the Brønsted-Lowry definition, the products of acid-base reactions also become interesting.

$HC_2H_3O_2 + OH^- \leftrightarrows H_2O + C_2H_3O_2^-$ (Na^+ ions left out as spectator ions.)

$C_2H_3O_2^- + H_2O \leftrightarrows$