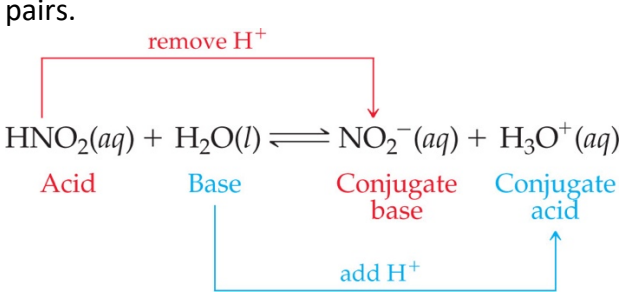
- **Acid**
  - Taste sour
  - Acids react with active metals (Mg) to produce H_2 (g)
  - Acids turn litmus RED
  - Acids react bases in neutralization reactions (no longer acids)
- **Base**
  - Taste bitter
  - Do not react with metals
  - Bases turn litmus BLUE
  - Bases react with acids in neutralization reactions (lose their basicity/alkalinity)

- **Arrhenius Acid**
  - when dissolved in water, increases the concentration of hydrogen ions (**H^+**).
  - HCl (aq) $\rightarrow$ **H^+** (aq) + Cl^- (aq)
- **Arrhenius Base**
  - when dissolved in water, increases the concentration of hydroxide ions (**OH^-**).
  - NaOH (aq) $\rightarrow$ **OH^-** (aq) + Na^+ (aq)

- **Brønsted-Lowry Acid**
  - An acid is a proton donor
  - **HCl** (g) (acid) + H_2O (l) → Cl^- (aq) + **H_3O^+** (aq)
- **Brønsted-Lowry Base**
  - A base is a proton acceptor.
  - **NH_3** (aq) (base) + H_2O (l) → NH_4^+ (aq) + OH^- (aq)

- **Role of H_2O**
  - **amphiprotic** (aka **amphoteric**)
    - Water can act as a Brønsted–Lowry base by accepting a proton (H^+) from an acid.
      - HCl (g) + H_2O (l) → Cl^- (aq) + H_3O^+ (aq)
    - Water can act as a Brønsted–Lowry acid by donating a proton (H^+) to a base
      - NH_3 (aq) + H_2O (l) → NH_4^+ (aq) + OH^- (aq)

- **Conjugate Acids and Bases**
  - Conjugate acid-base pairs differ only by H^+.
  - Reactions between acids and bases always involve two conjugate acid-base pairs.



  - Cocaine
    - free base (crack)
      - as a base: nonpolar so can be extracted from the coca plant with kerosene or gasoline
      - goes through the nonpolar membrane
    - cocaine hydrochloride
      - as an acid (salt): water soluble
    - treatment with HCl (H^+): base to acid
    - treatment with $Ca(OH)_2$ (OH^-): acid to base

HNO_3 (acid)	NO_3^- (conjugate base)
H_2SO_4 (acid)	HSO_4^- (conjugate base)
HSO_4^- (acid)	SO_4^{2-} (conjugate base)
SO_4^{2-} (base)	HSO_4^- (conjugate acid)