Acid + Bases (Ch 16)

March 1, 2019 10:00 AM

- Acids and bases appear in many disciplines of science
  - ↳ environmental science
  - ↳ biochemistry
  - } etc
- Notable application of acid + bases is Ocean Acidification

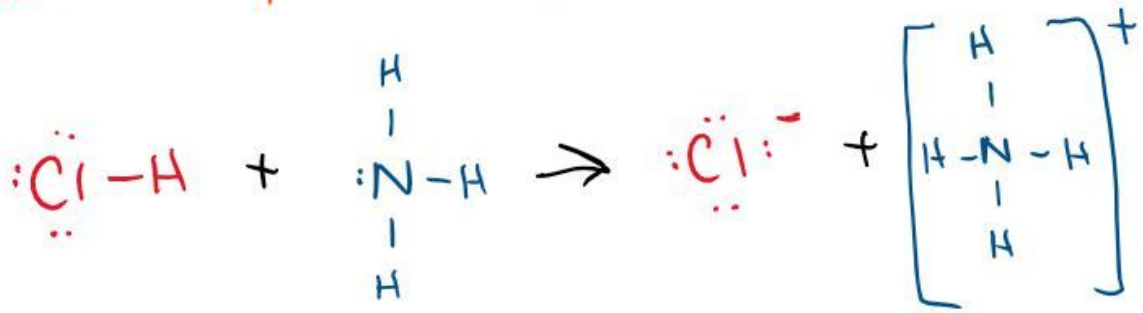
OBSERVED PROPERTIES

↳ Acids + Bases react to give neutral solution (neither acid nor base)
  ↳ neutralization

Bases	Acids
• taste bitter	• taste sour
• slippery	• caustic/corrosive

- There are indicators that identify whether something is an acid or a base

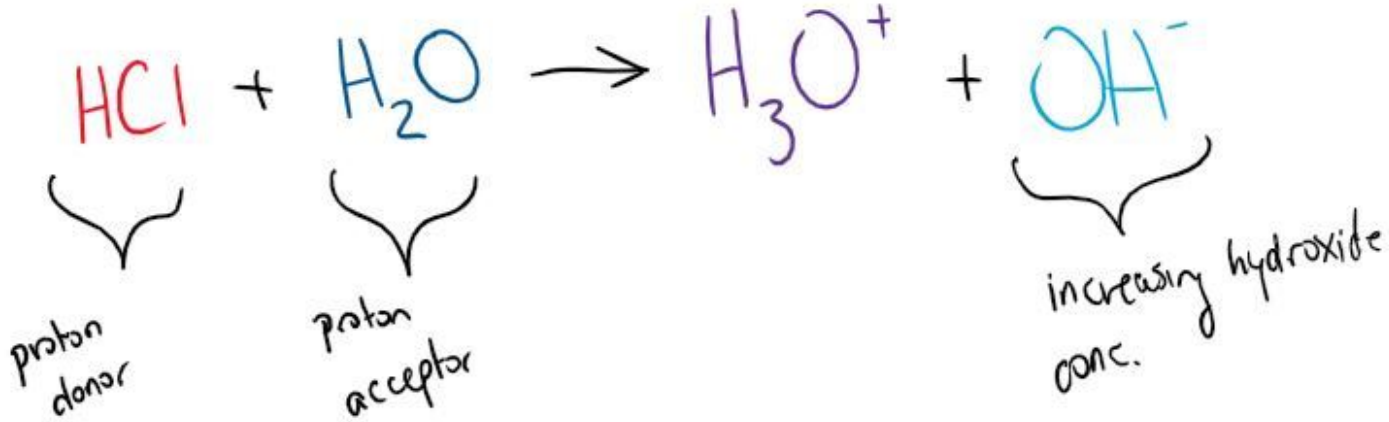
- Brønsted-Lowry def. of an acid
  - ↳ acid is a proton donor
  - ↳ base is a proton acceptor



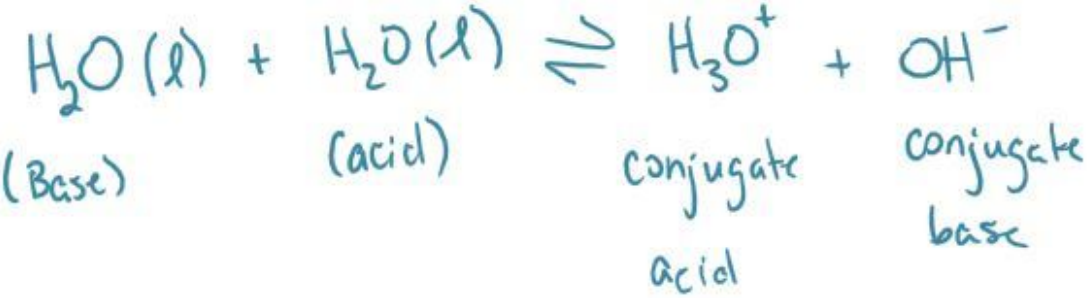
- Arrhenius Def.
  - ↳ acid is a substance that, when dissolved in water, increases the concentration of hydrogen ions
  - ↳ base is a substance that, when dissolved in H_2O, increases the concentration of hydroxide ions

- Note that water can act as either an acid or a base

  ↳ it is AMPHIPROTIC (amphoteric)



- Water can either donate or accept a proton



$HNO_2 + H_2O \rightleftharpoons NO_2^- + H_3O^+$

Acid — Base — Conjugate base — conjugate acid

loss proton

gained proton

$H_2O + NH_3 \rightleftharpoons NH_4^+ + OH^-$

Acid — Base — Conjugate Acid — Conjugate Base

$H_2SO_4 + H_2O \rightleftharpoons HSO_4^- + H_3O^+$

Acid — conj. base

$HSO_4^- + H_2O \rightleftharpoons SO_4^{2-} + H_3O^+$

Acid — conj. base

Relative Strength of Acid + Bases

↳ the stronger the acid, the weaker its conjugate base

↳ strong acid = conjugate bases DO NOT act as bases in water

↳ the stronger the base, the weaker its conjugate acid

↳ strong bases = conjugate acids DO NOT act as acids in water

- In every acid-base rxn, equilibrium favours transfer of the proton from the stronger acid to the stronger base to form the weaker acid and the weaker base

↳ ex: $\underbrace{HCl + H_2O}_{\text{stronger acid}} \rightleftharpoons \underbrace{H_3O^+ + Cl^-}_{\text{weaker acid}}$

$\underbrace{CH_3COOH + H_2O}_{\text{weaker acid}} \rightleftharpoons \underbrace{H_3O^+ \; CH_3COO^-}_{\text{stronger acid}}$