

Acid and Base Reactions

Properties of Acids

- **sour taste**
- **change color of litmus from blue to red**
- **give hydrogen on reaction with certain metals**
- **give carbon dioxide on reaction with carbonates and bicarbonates**
- **electrolytes (some strong, some weak)**

Properties of bases

- **bitter taste**
- **slippery to the touch**
- **change litmus from red to blue**
- **electrolytes (some strong, some weak)**

Definitions of acids and bases

Svant Arrhenius (Sweden) 1859-1927

Johannes Bronsted (Denmark) 1879-1947

G. N. Lewis (U.S.) 1875-1946

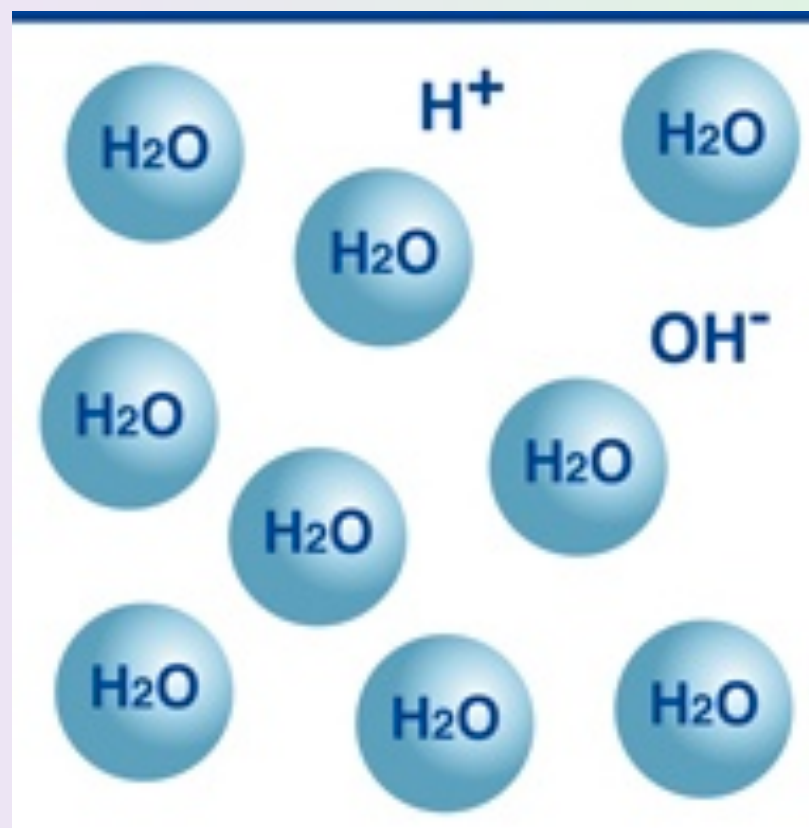
Arrhenius definitions of acids and bases

An acid dissolves in water to yield protons



A base dissolves in water to yield hydroxide ions



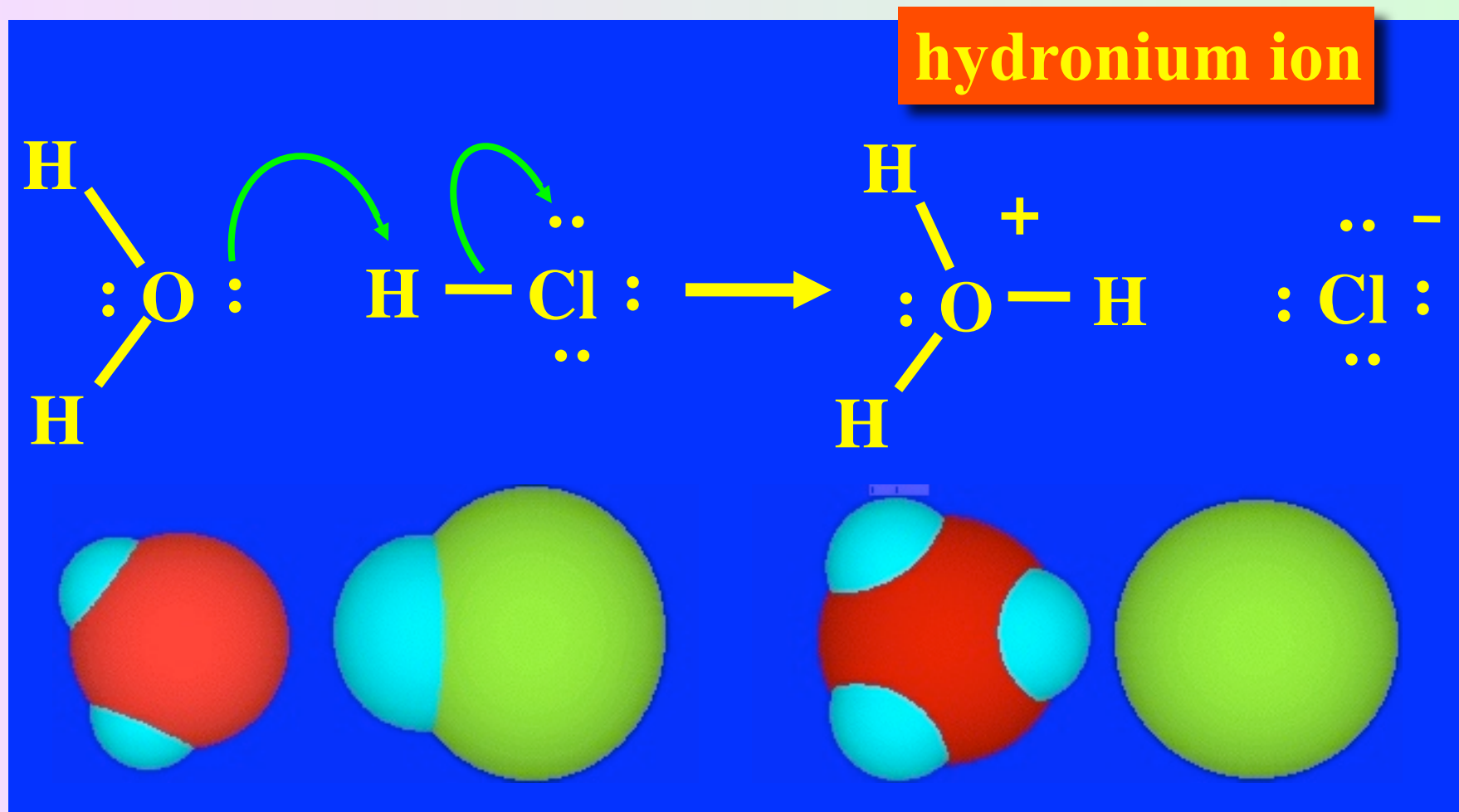


Bronsted Definition

An acid is a proton donor

An base is a proton acceptor

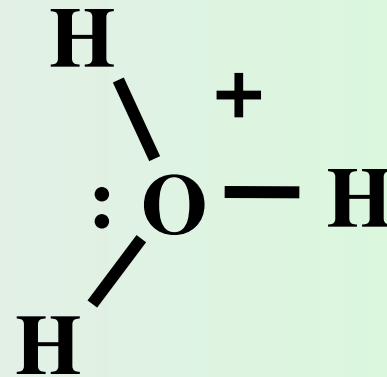
Proton transfer from HCl to water.



Hydronium Ion (H_3O^+)

for convenience $\text{H}^+_{(\text{aq})}$ represents the hydrated proton

But H_3O^+ is closer to reality



Monoprotic acids

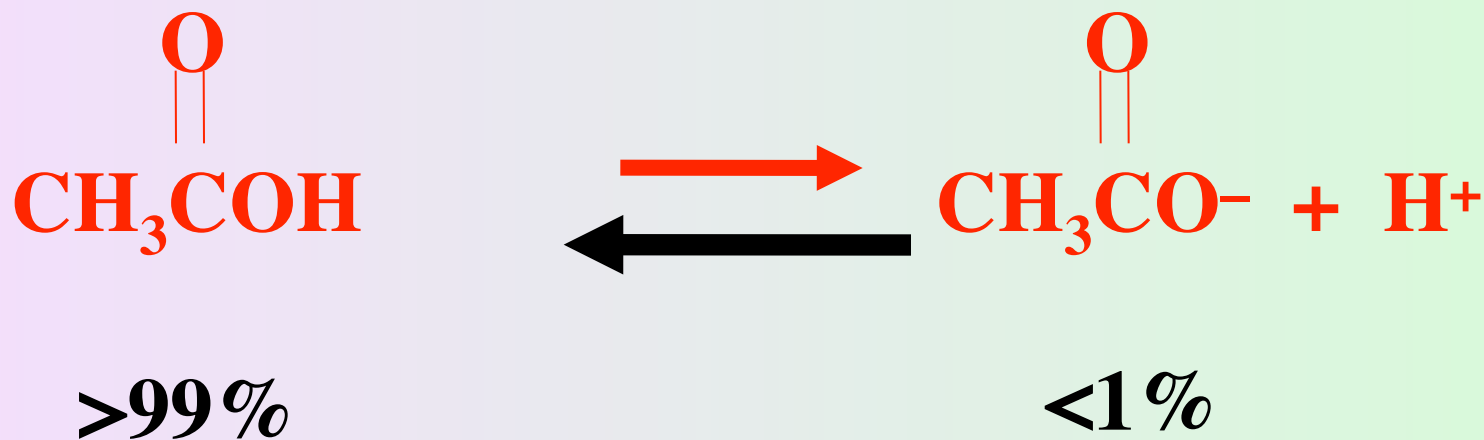
Have one proton that can be lost (Arrhenius) or donated (Bronsted) in water

HF, HCl, HBr, HI

HNO₃

Acetic acid is a monoprotic acid

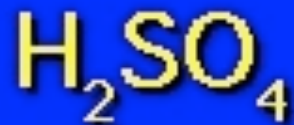
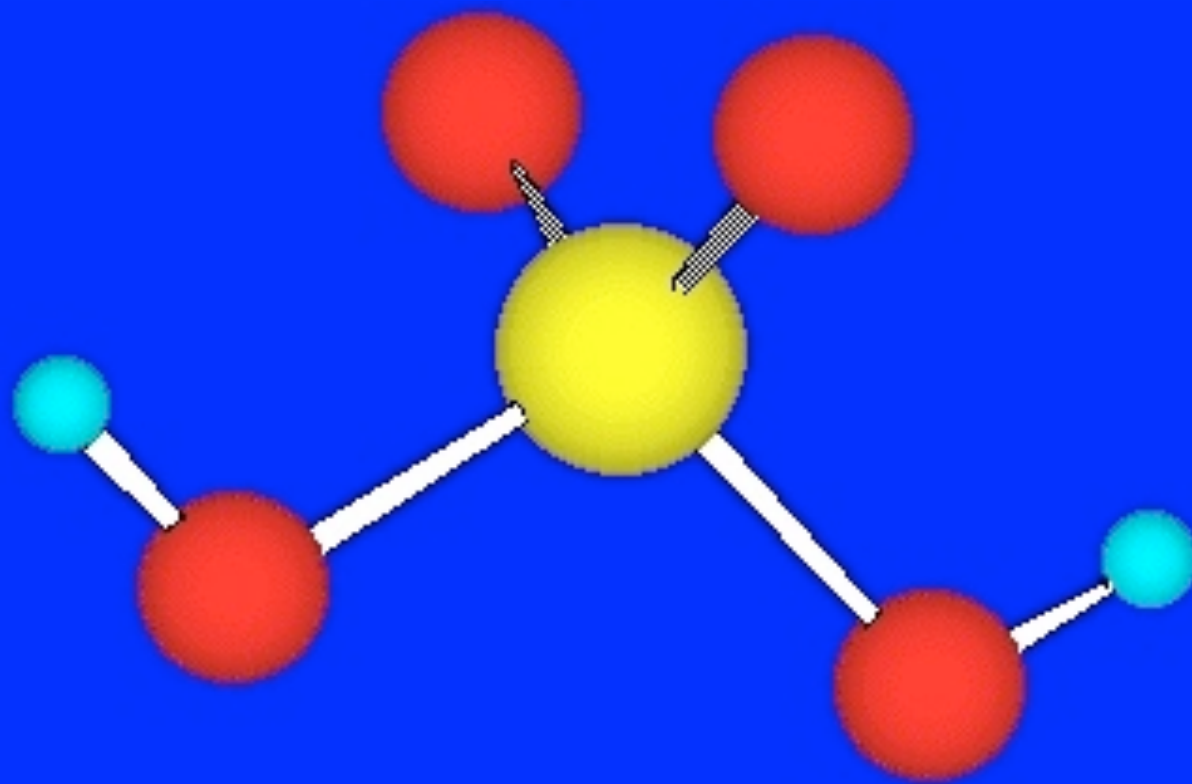
Acetic acid:



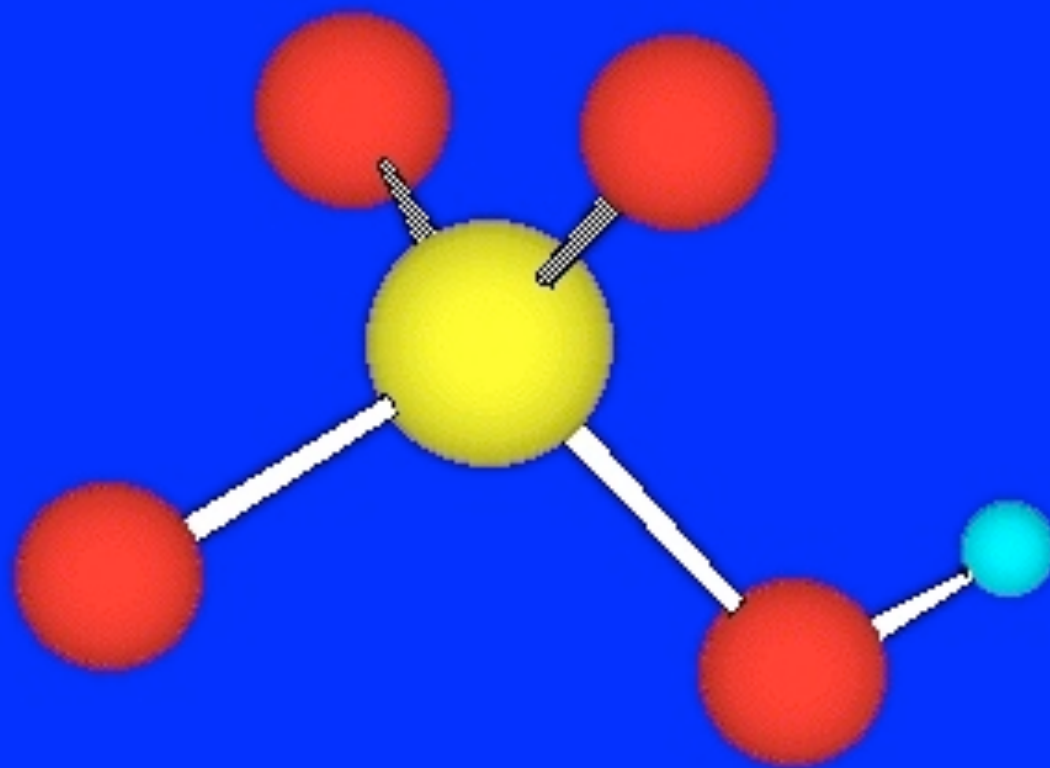
Sulfuric acid is a diprotic acid



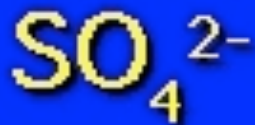
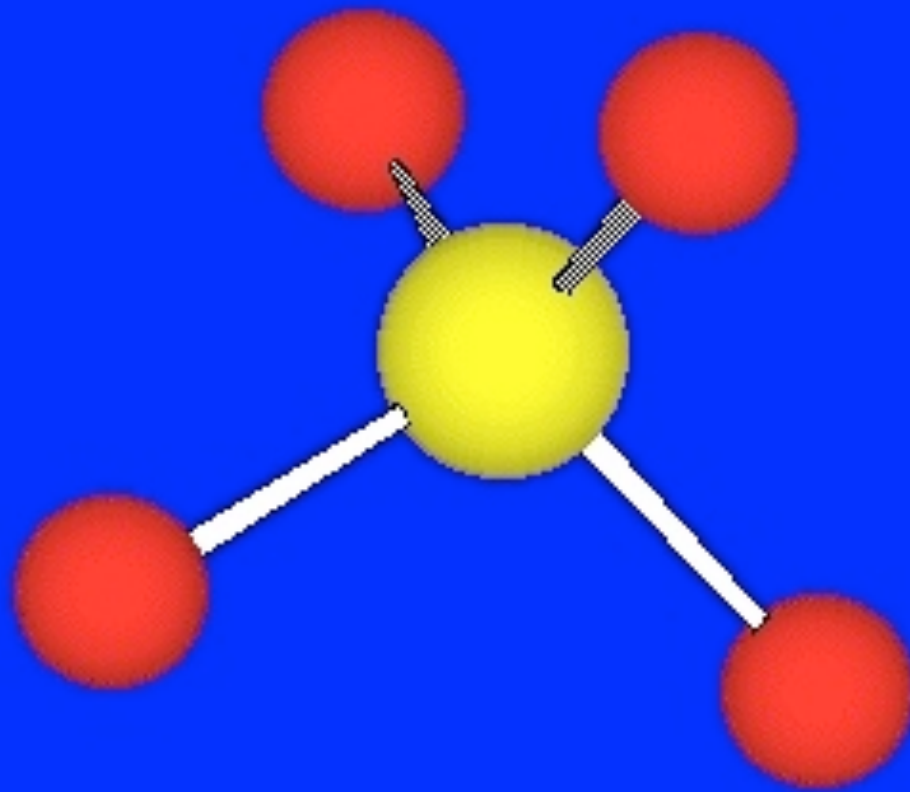
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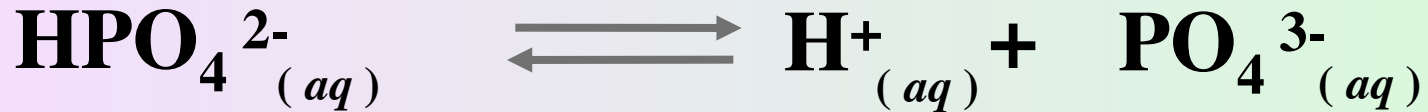
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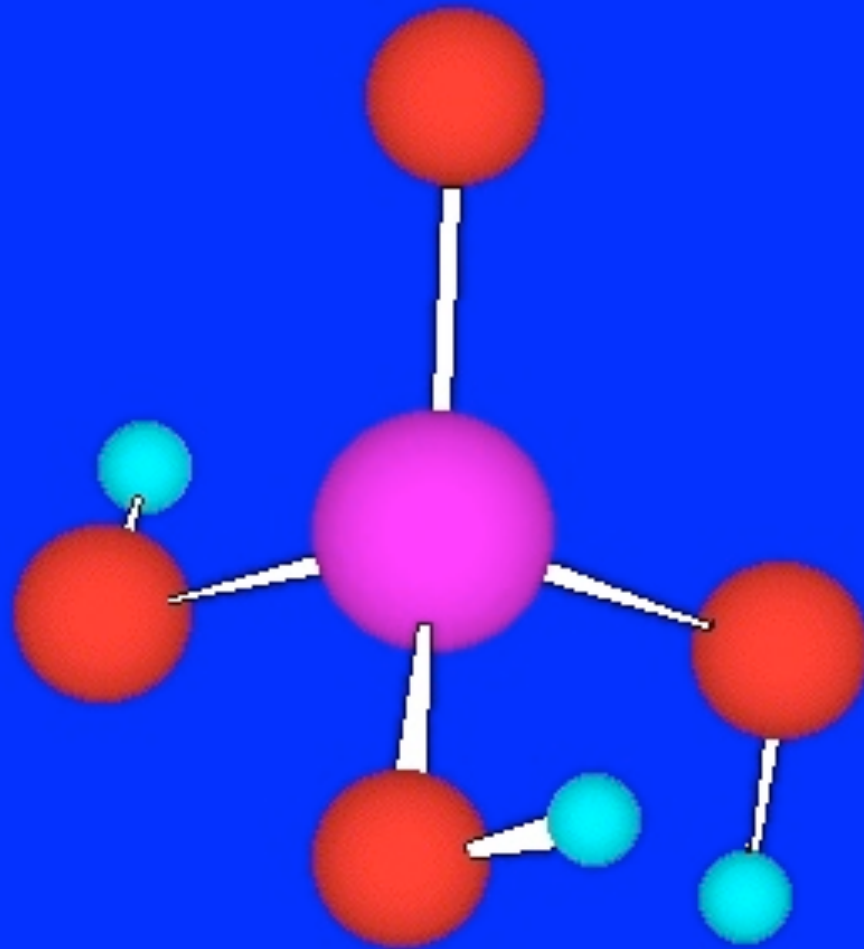
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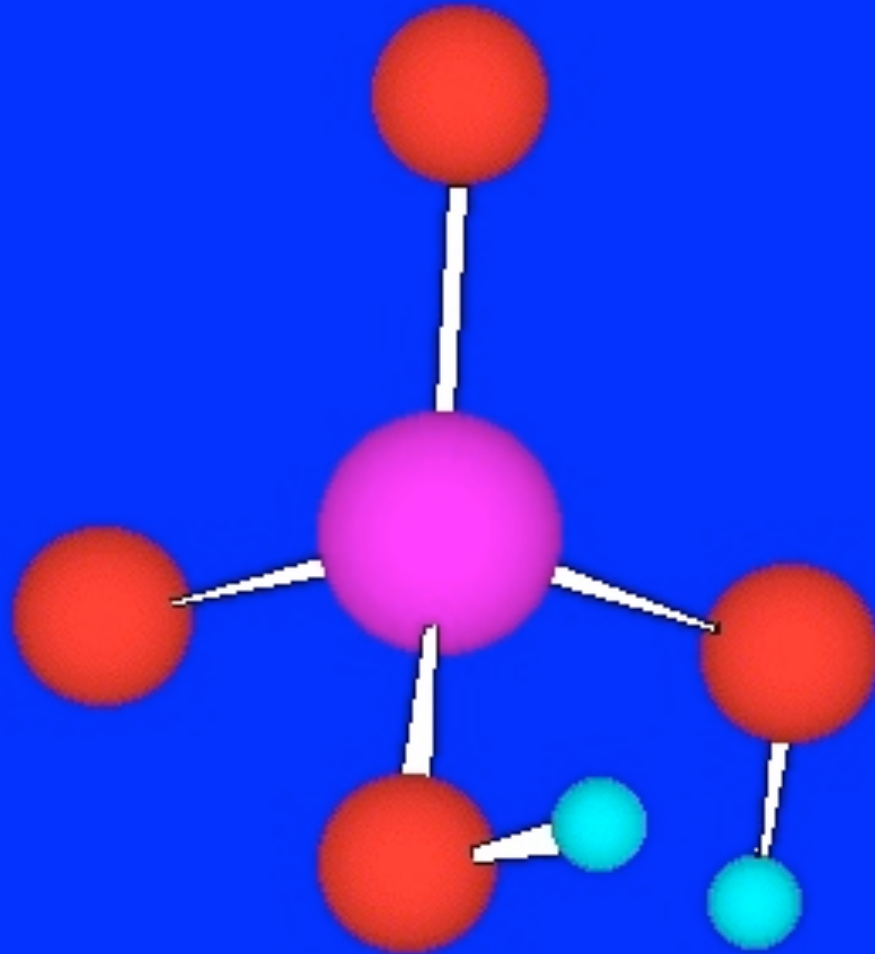
Phosphoric acid is a triprotic acid



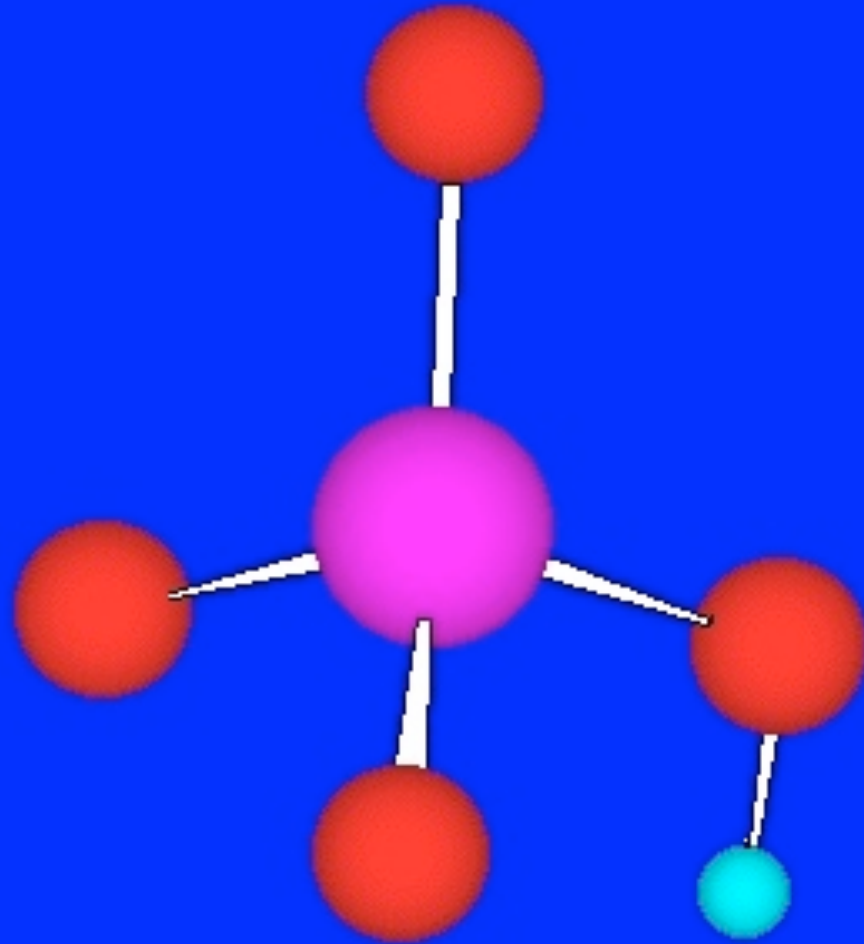
Phosphoric acid is a triprotic acid



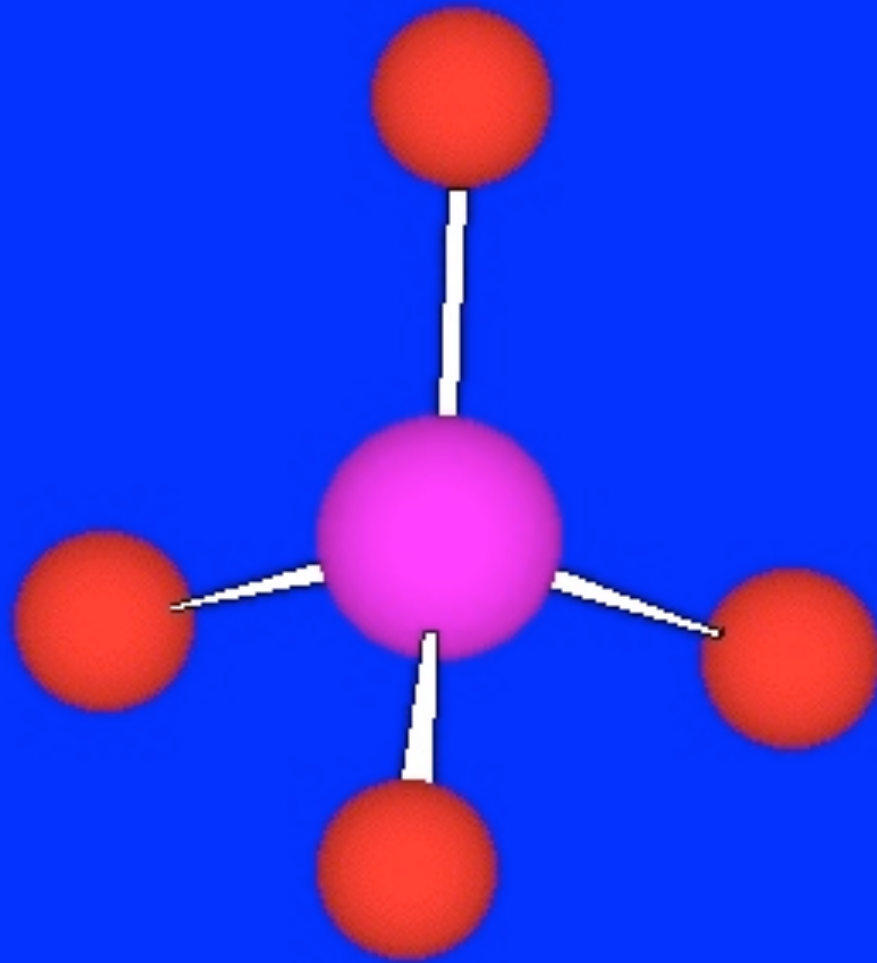
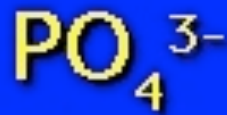
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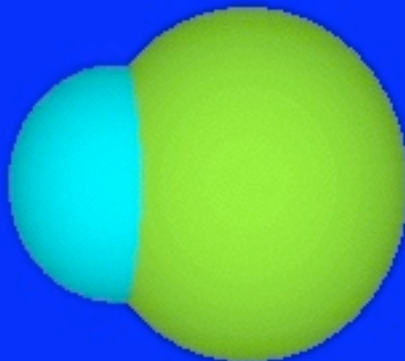
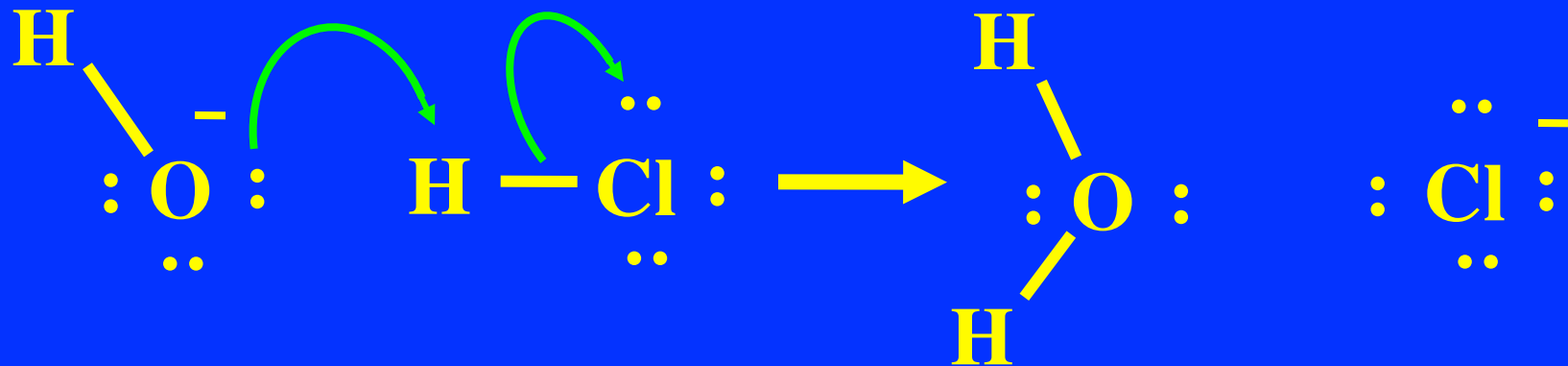


A base is a proton acceptor

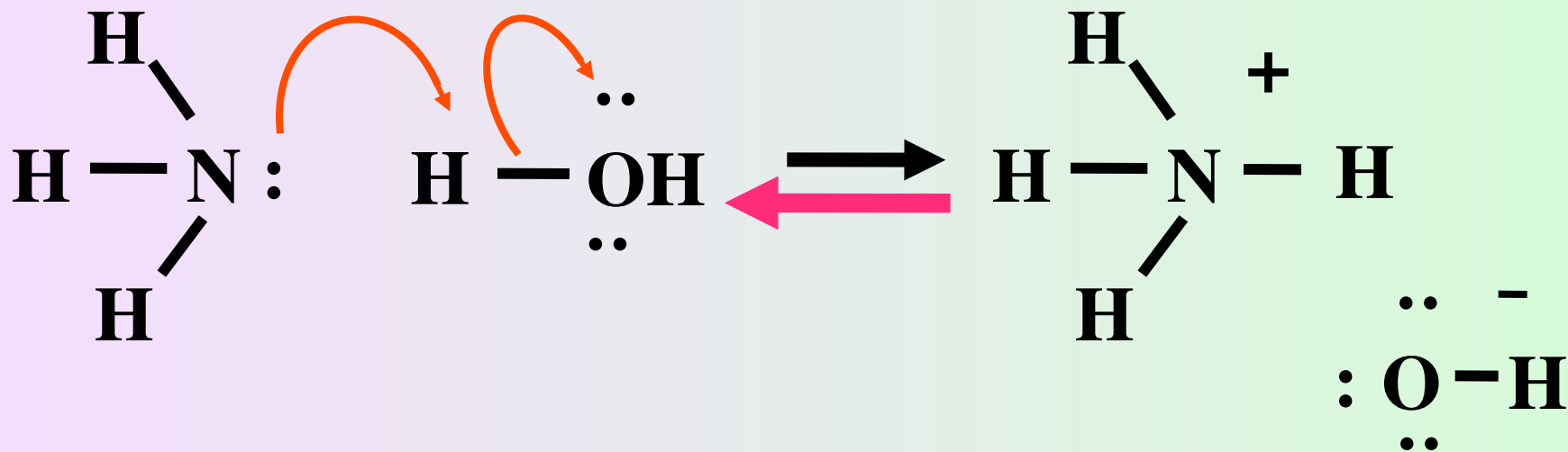
an example is NaOH

a source of hydroxide ions (OH^-)

A base is a proton acceptor



Ammonia is a Bronsted base



A Weak Base

Acid-Base Neutralization



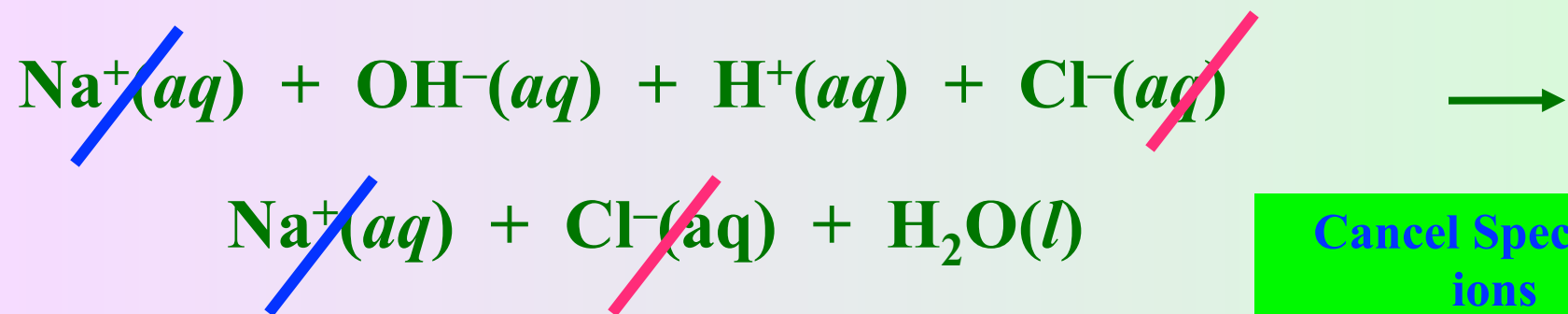
Neutralization

Example of Neutralization

Acid + Base \longrightarrow Salt + Water



Complete ionic equation



Cancel Spectator ions

Net ionic equation

