ACID - BASE

- Arrhenius: acid is an H^+ producer, base produces OH^-

Bronsted-Lowry: acid donates H^+, base is H^+ acceptor

Lewis: acid is e^- acceptor, base is e^- donor

★ pH ↑ = ↑ H^+
pH ↓ = ↑ OH^-

★ H_2O is amphoteric

base acid conj. acid conj. base

$NH_3 + H_2O \rightleftharpoons NH_4^+ + \underline{\underline{OH^-}}$ ⟹ NH_3 acts as base b/c increase $[OH^-]$

acid base

$NH_4^+ + H_2O \rightleftharpoons NH_3 + \underline{\underline{H_3O^+}}$ ⟹ NH_4^+ acts as acid b/c increase $[H_3O^+]$

concentration = Molarity = $\frac{\text{moles of solute}}{\text{liters of solution (volume)}}$

strength = acid/base strong or weak?

strong acid: $HClO_4$ HNO_3 HCl H_2SO_4 HBr HI

strong base: $LiOH$ $NaOH$ KOH $Ca(OH)_2$ $Sr(OH)_2$ $Ba(OH)_2$

ex) HCl 0.1M
$HC_2H_3O_2$ 3M

strong ⟹ 100% dissociate

weak ⟹ <100% dissociate

Conjugate acid/base pair

$HC_2H_3O_2 + H_2O \rightleftharpoons H_3O^+ + C_2H_3O_2^-$

$HC_2H_3O_2$: acid loses H^+ ⟹ $C_2H_3O_2^-$: acid minus H^+

H_2O: base accept H^+ ⟹ H_3O^+: base plus H^+

SOLUBILITY – PRECIPITATION

1.) Solubility Reaction: reactants begin as ~~aqueous~~ solid solutions to produce an aqueous solution with ions

Percipitation Reaction: reactants begin as aqueous solutions to produce a solid

2) $AgNO_{3(s)} + H_2O_{(l)} \longrightarrow Ag^+_{(aq)} + NO_3^-{}_{(aq)} + H_2O_{(l)}$

3) $AgNO_{3(aq)} + KCl_{(aq)} \longrightarrow AgCl_{(s)} + KNO_{3(aq)}$

4.) Soluble salts:

all nitrates
NaOH
KOH

Insoluble salts:

$PbSO_4$
$BaSO_4$
AgCl
AgBr

COMPLEX FORMATION - DISSOCIATION

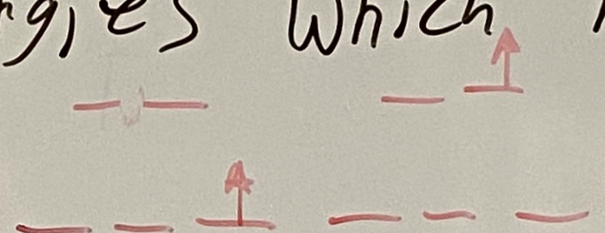
Cl^- $AgCl_2^-$

- Ligand → ion or neutral molecule that can bind to a metal by coordinate bonds

EX: $H_2\ddot{O}$, NH_3, $:C\equiv O:$; hemoglobin, myoglobin

- The color change is caused by a split

in d-orbital energies which high/low energies emit light



- Bidentate → A ligand w/ 2 lone pairs able to be shared w/ a metal

- coord # → # of binding locations to the metal

$[Cu(NH_3)_4]^{2+}$ $[Cu(en)_2]^{2+}$

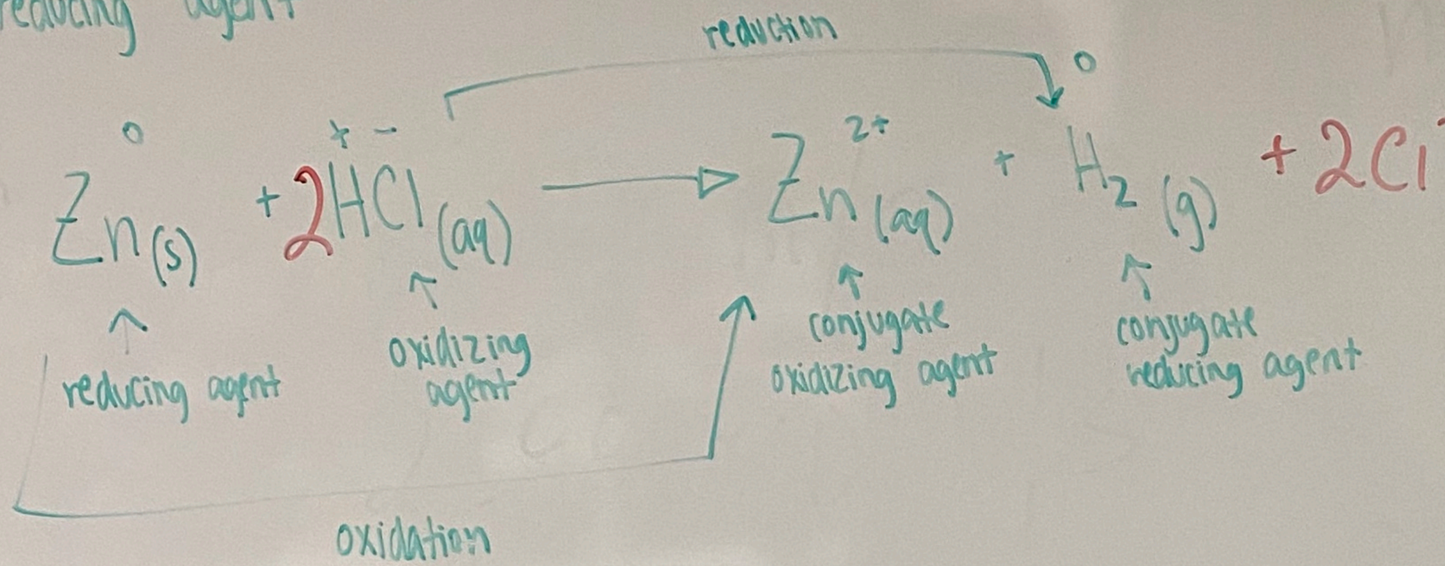
Oxidation-Reduction

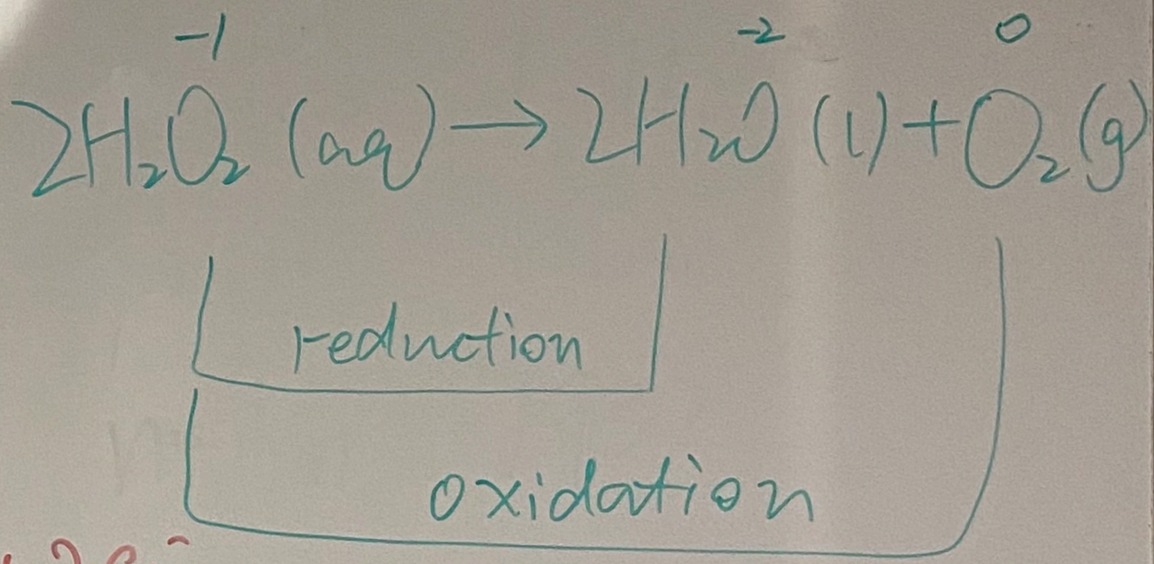
oxidation : losing e^-

reduction : gaining e^-

oxidizing agent : reactant reduced

reducing agent : reactant oxidized





H_2O_2 : Both reducing agent & oxidizing agent

H_2O : conjugate reducing agent

O_2 : conjugate oxidizing agent

Strength : how easily compound breaks up - strong oxidizing agent - easier to gain e-

Concentration : amount of agent in solution

On product side, whatever was the oxidizing agent on the reactant side, is now the conjugate reducing agent.