

### Electrolysis

Guidlines	Metal Purification
Non-metal at anode	Thin pure Metal at cathode
metal at cathode	Thick impure metal at anode
If halogen present -> anode	Electrolyte soluble salt of metal
Cathode -> least reactive <i>metal</i>	
$\text{OH}^-$ at anode -> $4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4e^-$	

### Metals

#### Iron Extraction

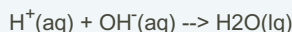
raw materials: coke(C), Hot air, Limestone( $\text{CaCO}_3$ )

- $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
- $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- $\text{CO}_2 + \text{C} \rightarrow 2\text{CO}$
- $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$  (700 celcius)
- $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3(\text{slag})$

### Acid, Bases and salts

#### Neutralization Reaction

Acid + Base -> Salts + Water



#### Rules

- All Nitrates are soluble
- all sodium, potassium, ammonium salts are soluble
- all chlorides are soluble except *lead* and *silver*
- all sulfates are soluble except *Barium*, *calcium*, *lead*
- all carbonates and hydroxides are insoluble

#### Methods

acid + metal -> salt + hydrogen (*MAZIT* metal)

acid + carbonate -> Salt + water + carbon Dioxide

*Titration*: acid + alkali -> salt + water (reactive metals)

acid + *insoluble* base -> salt + water(unreactive metals)

*Precipitation(insoluble)*: Soluble salt + Soluble salt -> insoluble salt + soluble salt

- example: Barium Chloride + Sodium Sulfate -> sodium chloride + barium sulfate

### Organic Chemistry

#### All Organic Compounds

*Combustion*: organic compound + oxygen -> carbon dioxide + water

### Organic Chemistry (cont)

#### Alkanes

*Substitution Reaction*: Alkane + Chlorine -> Chloroalkane + Hydrogen

-example:  $\text{CH}_4 + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \text{HCl}$

*Cracking*: long alkane -> shorter alkane + alkene

-example:  $\text{C}_{12}\text{H}_{26} \rightarrow \text{C}_{10}\text{H}_{22} + \text{C}_2\text{H}_4$

*Thermal Cracking*: Catalyst- Broken Unglazed Pottery

*Catalytic cracking*: 550 degree cel and chromium oxide catalyst

#### Alkenes

*Hydrogenation*: alkene + hydrogen -> alkane (200<sup>deg</sup>, nickel)

*Hydration*: alkene + steam -> alcohol (300<sup>deg</sup>, 6000<sup>kPa</sup>, Phosphoric(V))

*halogenation(alkene Test)*: alkene + bromine -> dibromoalkene (brow

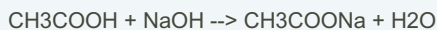
#### Alcohol

*Oxidation*: ethanol + oxygen -> ethanoic acid + water (Pottasium Mang

*Fermentation*: glucose -> ethanol + carbon dioxide(yeast)

#### Carboxylic Acid

ethanoic acid + sodium hydroxide -> sodium ethanoate + water



ethanoic acid + magnesium -> magnesium ethanoate + hydrogen



ethanoic acid + sodium carbonate -> sodium ethanoate + carbon dioxide



### Chemical Reactions

#### Haber Process



*Conditions*:

- 20000 kPa

- 450 celcius

- Iron catalyst

#### Contact Process



*Conditions*:

- 200 kPa

- 450 celcius

- Vanadium(V)oxide

### Chemistry Of the environment

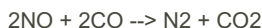
#### Test For Water

- anhydrous copper(II)sulfate turns from *white* to *blue*

- Cobalt(II) Chloride Paper turns from *blue* to *pink*

- impure water has higher boiling point

#### Catalytic Converter



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