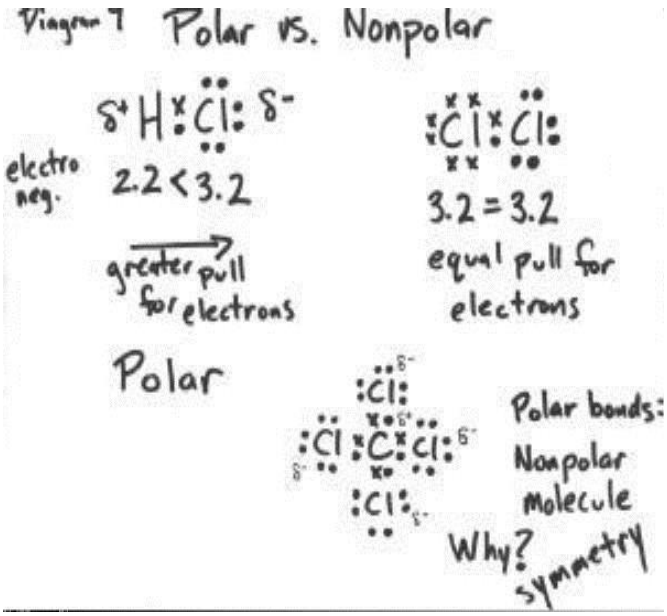
Memorize It & Know It List!

1. **The following Lewis dot diagrams and their resulting polarities:**
All 7 "up" elements
H_2O
CO_2
HCl
NH_3
CH_4



2. **Four types of chemical equations:**
Single **R**eplacement
Double **R**eplacement
Synthesis
Decomposition

3. **Organic Reactions – write them out on flash cards and memorize!**
Addition
Substitution
Combustion
Fermentation
Saponification
Polymerization
Esterification

4. **pH scale stuff:**
Acids < 7 Neutral 7 Bases > 7
A change of 1 pH unit lower = 10x more acidic (10x more H^+ ion concentration)
A change of 2 pH units higher=100x (10x10) less acidic (100x less H^+ ion in solution)

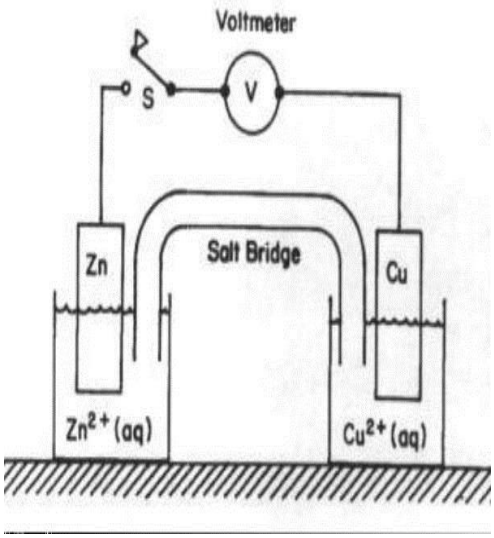
5. **Helpful Redox ditties, like**

"OIL RIG" "Reduction is reduction (of charge value)."

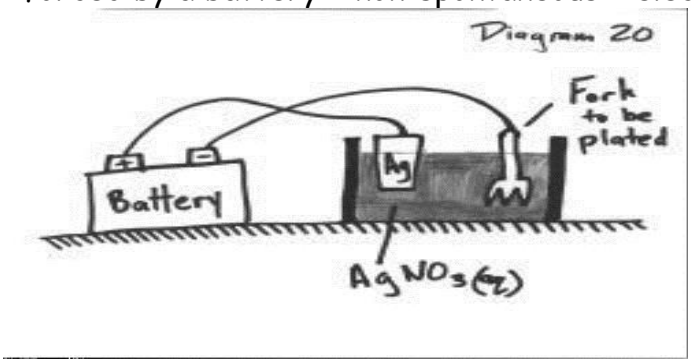
For electrochemical cells: "RED CAT" redox at cathode, AN OX oxidation at anode

Voltaic = battery = spontaneous = chemical→ electrical energy

More "A"ctive metal "A"node



Electrolytic = forced by a battery = non-spontaneous = electrical → chemical energy



6. **Bonding Basics**

Ionic -> Metal /Nonmetal bonding, *valence e^- transferred,*

Lewis dot diagram uses brackets like: $[Na]^+$ $[:\ddot{Cl}:]^-$

Covalent → nonmetal/nonmetal bonding, *valence e^- shared, (sharing is "c"aring "c" for covalent)*

Lewis diagram does not use brackets, like: H:H or $\ddot{O}::C::\ddot{O}$

7. **Conductivity – there must be MOBILE (movable) charged particles (ions or electrons) present**

- For solutions, the solute must dissolve to produce IONS(electrolyte)
- For liquids, only melted ionic materials conduct
- For metals, conductivity because of the mobile sea of valence e^-

8. **Properties based on Bond type – Know this chart**

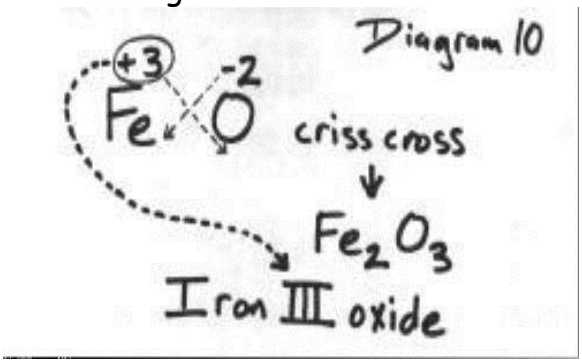
Type of bonding	Conductivity	Hardness	Melting points
Ionic (salts)	Only when melted of dissolved	Brittle	High NaCl: 1074 Kelvin
Molecular (covalent)	None	Soft	Low H_2O: 273 Kelvin
Metallic (pure metals and alloys)	Solid and liquid states	Malleable	High Fe: 2523 Kelvin

9. **Names – Ionic vs Covalent**

1st, look at formula and decide if it is molecular (covalent bonds, all nonmetals) or ionic (metal and nonmetal, or polyatomic Table E ions).

Ionic: Decided by is it a metal/nonmetal combo…

Check metal… if has more than one charge (oxidation number) must use Roman numeral, then just write nonmetal name, take of element ending and add "ide"… if polyatomic ion, use Table E to get name. DO NOT USE PREFIXES!



Molecular: Decided by is it a nonmetal/nonmetal combo:

Just look at formula, and use prefixes to indicate the number of atoms of each type: P_2O_5 = **Di**phosphorus **p**entaoxide

Prefixes: 1 = mono 2 = di 3 = tri 4 = tetra 5 -10 same as on Table P

10. **Special Group Names**

Group 1 = **Alkali** (**one** word description for Group **1**)

Group 2 = **Alkaline Earth** (**two** word description for Group **2**)

Group 17 = Halogens

Group 18 = Noble Gases

10. **Endo vs Exothermic**

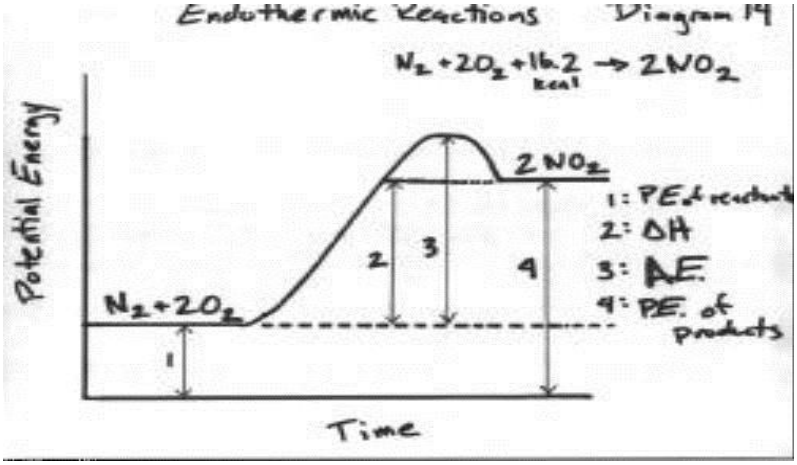
Endo: $+\Delta H$,

Heat ENTERS (added as a reactant),

Heat written into equation as a reactant,

If touched, feels cold (draws heat out of you, entering reaction)

Temp of surrounding air or solution decreases



Memorize the meaning of all 4 arrows on these diagrams!

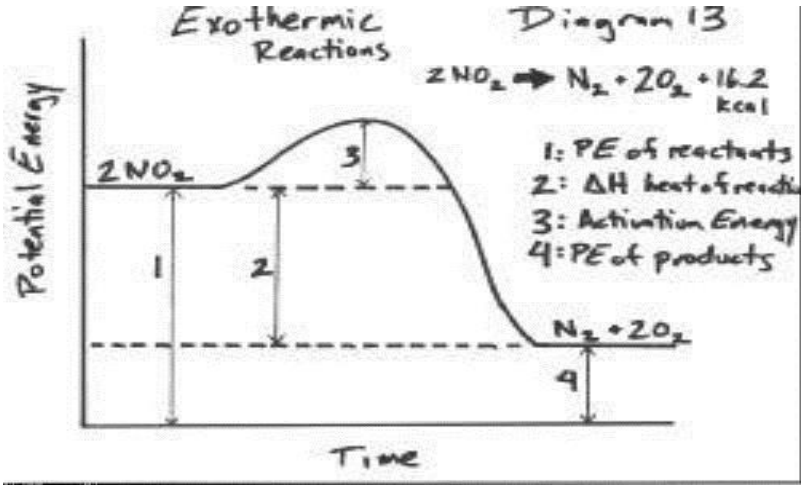
Exothermic: $-\Delta H$,

Heat EXITS (released as a product),

Heat written into equation as a product,

If touched, feels warm (releases heat to you, from the reaction)

Temp of surrounding air or solution increases



Use of Table I, hint about Exothermic at bottom
Change in PE diagrams with a catalyst

11. **Physical state of elements at STP (STP defined on Table A as… 273 K and 1 atm)**
All elements are solids except the:

2 liquids – Br (bromine) and Hg (mercury)
11 gases – 6 Noble Gases plus H, O, N, F, Cl