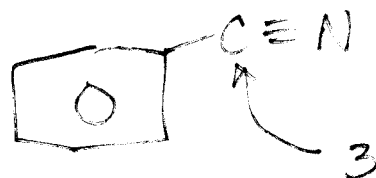
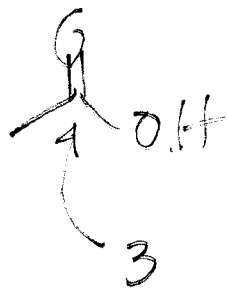
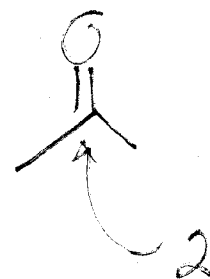
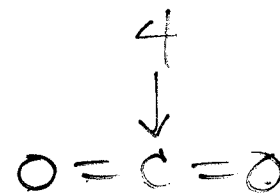
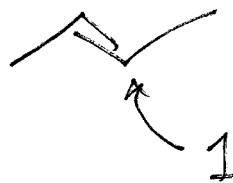
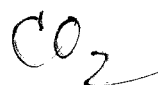
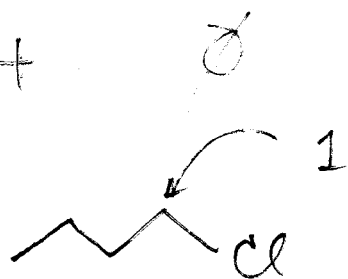
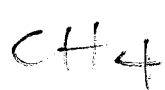


Ch. 19 - Redox

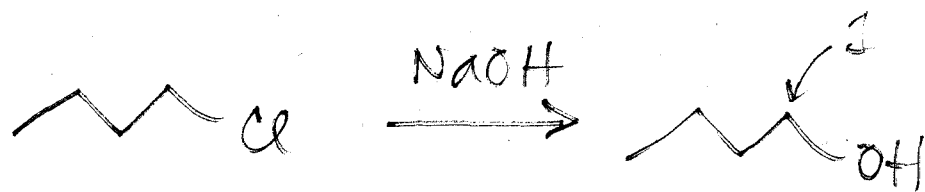
Redox rxns come in pairs - the oxidizing agent is reduced; the reducing agent is oxidized

oxidation state of a carbon:

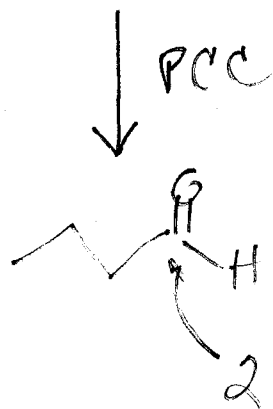
heteroatoms + # π bonds



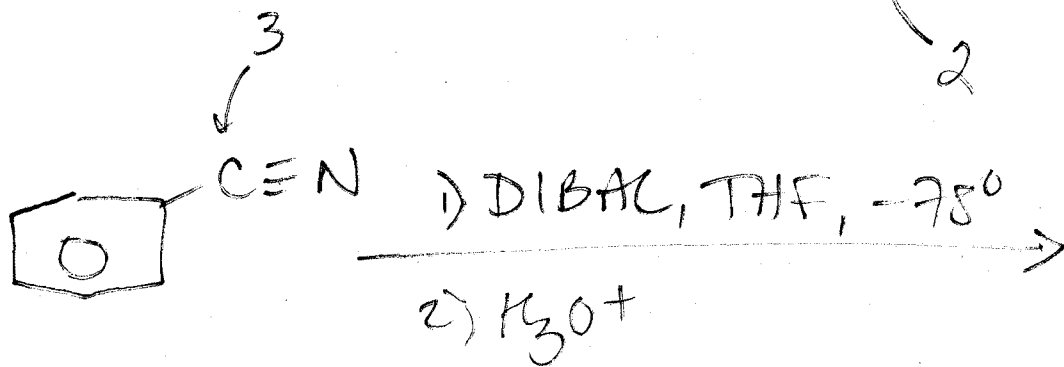
It's only redox when the ox. state changes.



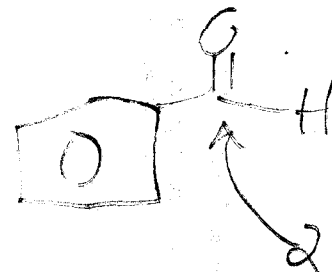
NOT redox.



oxidation

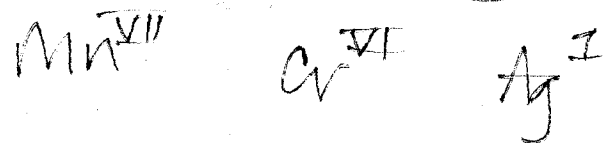


reduction



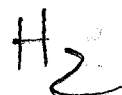
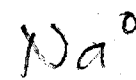
oxidizing agents.

often metals in high
oxidation states



reducing agents.

elemental metals



~~End of~~

Reduction Reactions

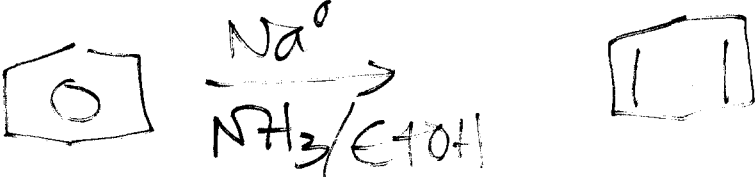
1. Catalytic hydrogenation $H_2/cat.$
 - a. alkene \rightarrow alkane
(alkyne) Pd, Pt, Ni
 - b. alkyne \rightarrow alkene
(cis) Lindlar's cat
 - c. aldehyde / ketone \rightarrow alcohol $Ra-Ni$
 - d. acid chloride \rightarrow alcohol
partially deactivated Pd catalyst
• Rosenmund reduction

Cannot use cat. hydrogenation on
carboxylic acids or other derivs.

2. "Dissolving metal" reductions

Na^0 or Li^0 usually in NH_3 or NH_3/EtOH

a. alkyne \rightarrow alkene (trans) Na^0/NH_3

b.  * Birch reduction

3. Hydride reductions - all use H^-

a. NaBH_4 - often used in EtOH

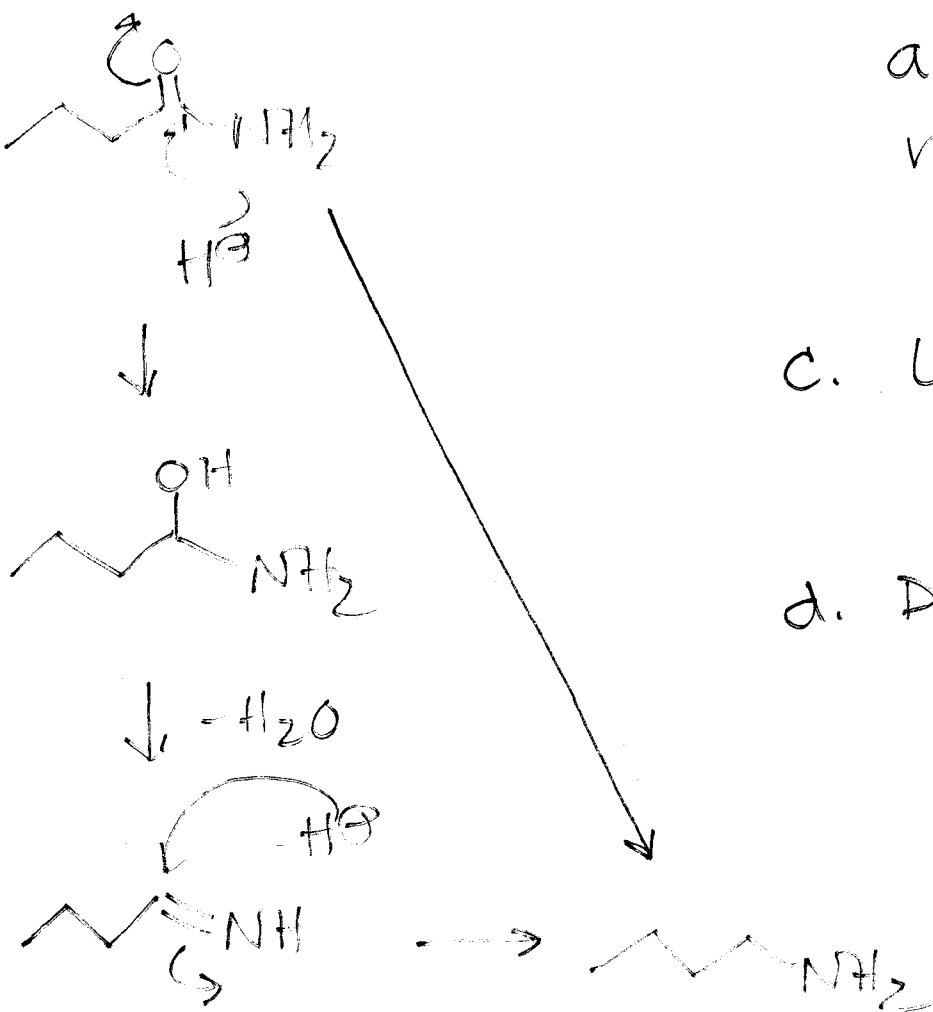
will reduce: aldehyde, ketone, acid chloride
 \rightarrow alcohol

will not reduce: all other acid derivs.
alkenes, alkynes

b. LiAlH_4 - must be used in aprotic solvent.
 step 2 is H_3O^+

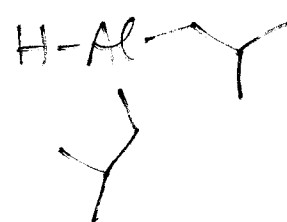
will reduce: aldehyde, ketone, acids, acid derivs. \rightarrow alcohols

amide \rightarrow amine
 nitrile \rightarrow $-\text{CH}_2\text{NH}_2$] via imine



c. $\text{LiAlH}(\text{O}t\text{Bu})_3$ acid chloride \rightarrow aldehyde

d. DIBAL



step 2
 H_3O^+

ester \rightarrow aldehyde
 nitrile \rightarrow aldehyde