CHAPTER 10

Alkyl halides are good electrophiles. We have seen them used in the alkylation of terminal alkynes. The electronic nature of organohalides can be reversed by converting them into organometallic compounds. A variety of metals readily insert between the Carbon-Halogen bond to form a new Carbon-Metal bond. Thus, a reversal of polarity results. Organometallic compounds are typically nucleophilic.

Grignard reagents are formed from the insertion of Mg into the C-X bond. Since they are good bases, they are very sensitive to protic conditions, and will be protonated by alcohols, amines, water, etc. This is useful if one wants to reduce a halide to an alkane, or to introduce deuterium isotopes. They are also good nucleophiles and react with electrophiles such as a carbonyl compound.

Lithium reacts similarly. These organolithium compounds will form Gilman Reagents when reacted with Copper (I) salts. Gilman reagents will couple with organohalides to form new carbon-carbon bonds. Note that 2 organolithium compounds react with 1 Cu salt to form a "cuprate" where there are two organo groups on the copper. Only 1 of them is reactive.
Grignard and Gilman reagents can be prepared from all kinds of halides, including vinyl (on a double bond) and aryl (on an aromatic ring like benzene). In addition, the coupling reaction between Gilman reagents and organic halides can be done with vinyl and aryl halides as well.

Oxidation - a reaction that causes a decrease in electron ownership by carbon - replace a bond to a less electronegative atom with a more electronegative atom.

Reduction - a reaction that causes an increase in electron ownership by carbon - replace a bond to a more electronegative atom with a less electronegative atom.

**Oxidation: C-H replaced with C-Cl**

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\text{CH}_4 \xrightarrow{\text{Cl}_2, \text{light}} \text{CH}_3\text{Cl}
\]

**Oxidation: 1 C-C replaced with C-Cl and 1 C-C replaced with C-O**

**Reduction: 2 C-C bonds replaced with C-H bonds**