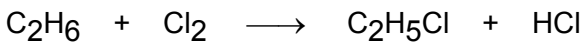
Summary of Organic Reactions

Hydrocarbons

A. Alkanes (generally unreactive)

1. free radical substitution (not selective!)



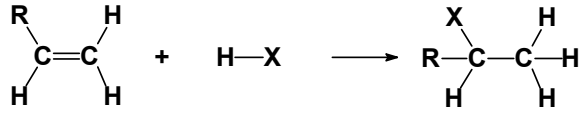
$$C_2H_6 + Cl_2 \longrightarrow C_2H_5Cl + HCl$$

2. dehydrogenation (reverse reaction is more common!)

$$C_2H_6 \longrightarrow H_2C{=}CH_2 + H_2$$

B. Alkenes

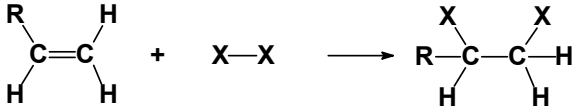
addition to double bond



HX where X = Cl, Br, I, or OH (i.e., H_2O)

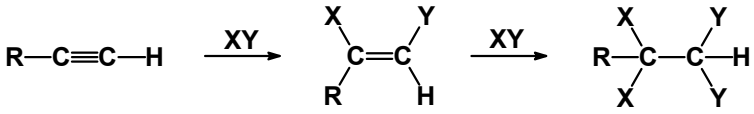
- *Markovnikov's* rule: "them that has, gets"
  (H goes on the C that already has the most H's)

- addition of *non-polar* reagents (H_2, Br_2, etc.) also occurs



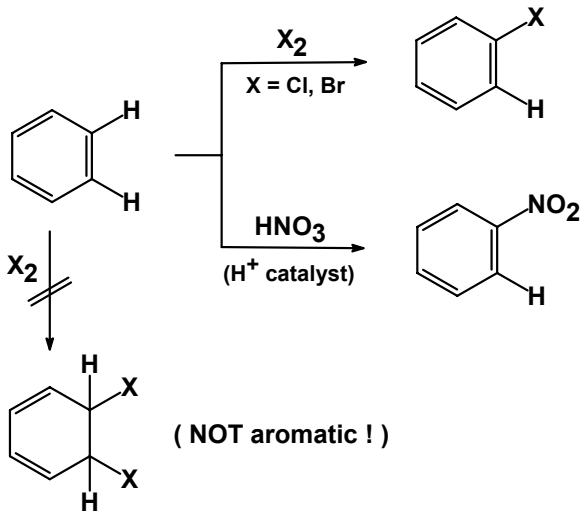
C. Alkynes

- similar addition reactions as alkenes (stepwise addition can occur)



D. Aromatic Hydrocarbons (Benzene and its derivatives)

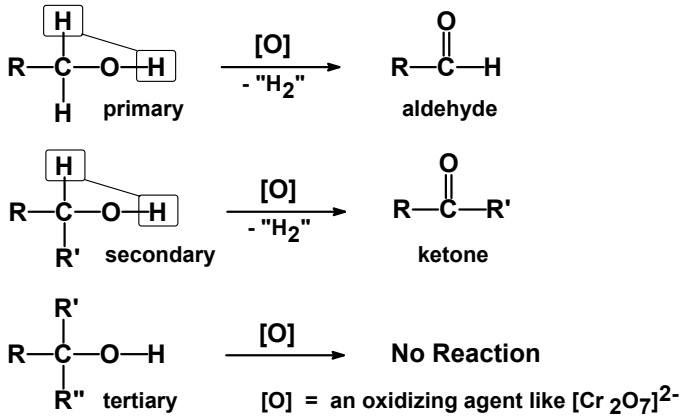
- *Substitution* Reactions (never addition!)



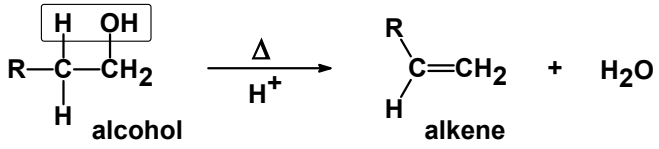
Reactions of the Other Functional Groups

A. Alcohols R-O-H

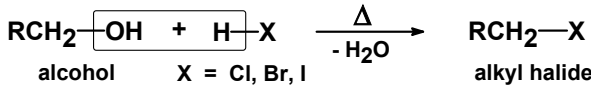
1. *Oxidation* of alcohols:



2. *Elimination Reactions* of alcohols:

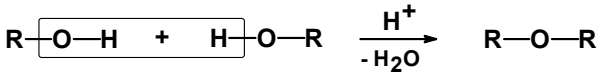


3. *Substitution Reactions* of alcohols:



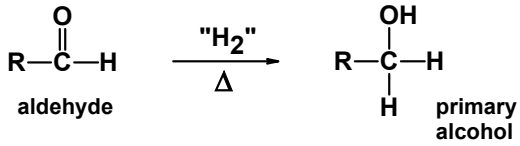
B. *Ethers*, R-O-R'

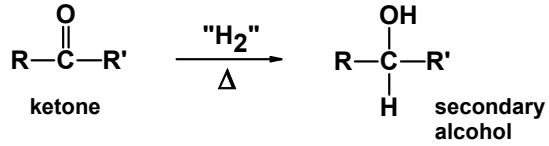
Ether *Synthesis*:



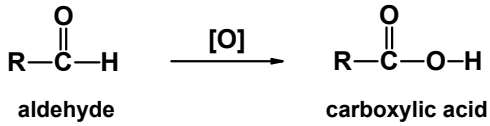
C. Aldehydes and Ketones

1. *Hydrogenation (reduction)* of aldehydes and ketones



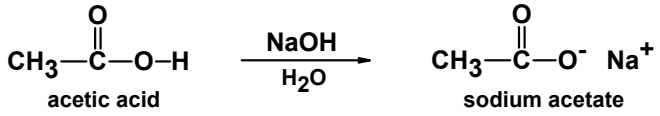


2. *Oxidation* of aldehydes (very easy!)

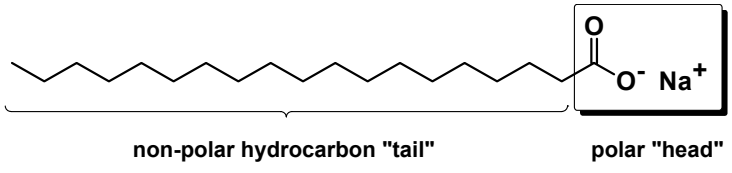


D. Carboxylic Acids

1. Acid + Base ⟶ *Salt* of Acids:

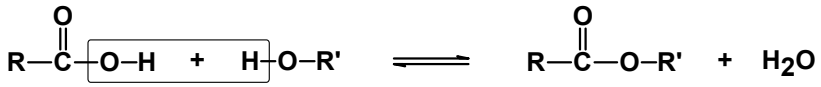


e.g. Soap is a salt of long chain carboxylic acid

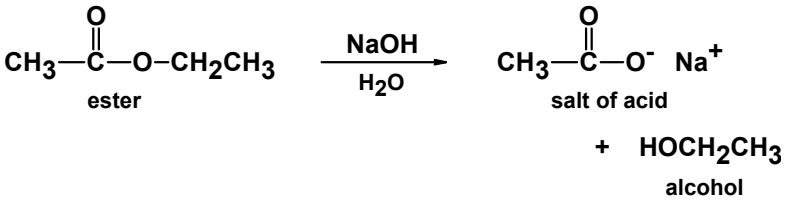


E. Esters

1. *Formation* of Esters (from acid + alcohol)

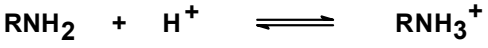


2. *Saponification* of Esters (hydrolysis)



F. Amines

amines are *weak bases*, so base + acid ⟶ salt



G. Amides

Formed from acid and amine: