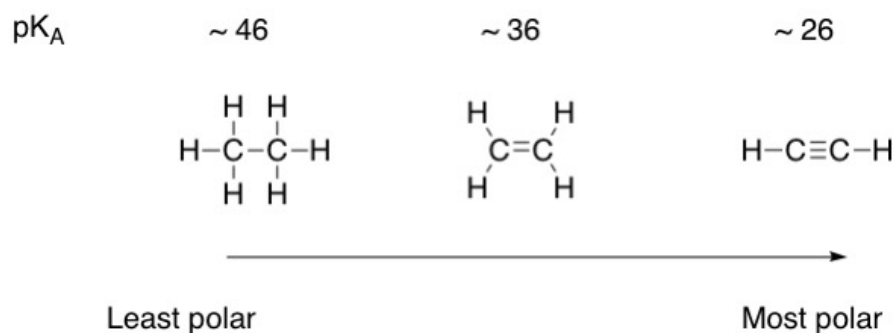
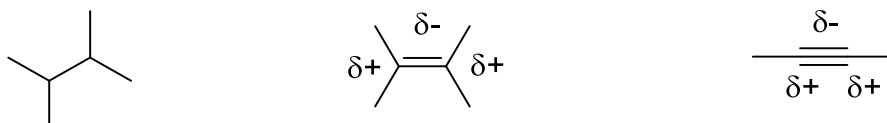
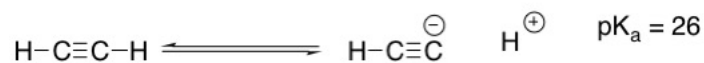
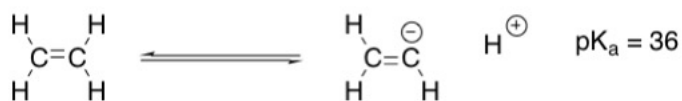
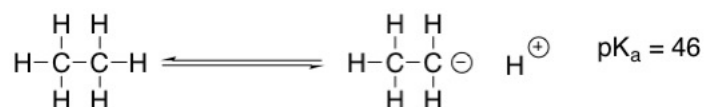


Characteristics of Alkanes, alkenes, and alkynes

Polarity is due to charge distribution within the molecule:

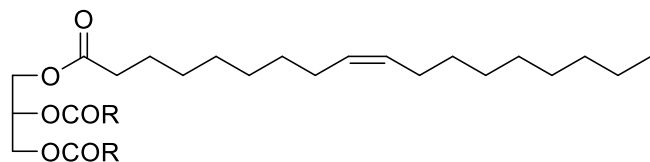


Alkynes have higher boiling point, melting point, and density. Polarity drops from alkynes to alkanes as well as reactivity and boiling point values (polar substances stick together more strongly than non-polar)

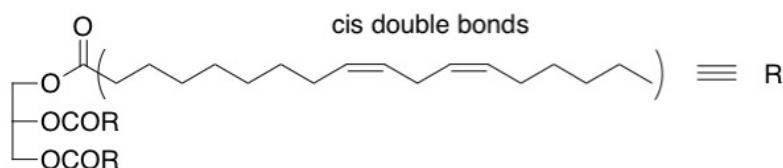
Acidity of Alkanes, Alkenes, and Alkynes

- Equilibrium lies to the left in each of these reactions as alkanes, alkenes, and alkynes are very weakly acidic.

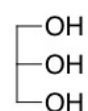
Natural Product Containing Alkenes: Fats



Monounsaturated triglyceride

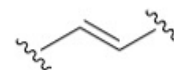


A triglyceride

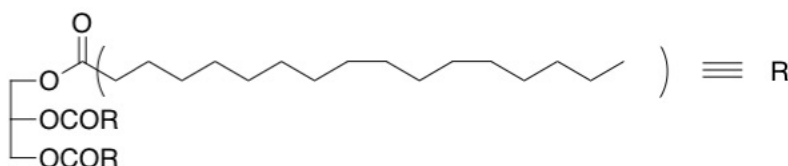


Glycerol

trans double bond



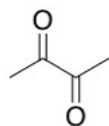
- The triglyceride is a **triester of glycerol**
- It is a polyunsaturated (>1 double bond) fats (e.g. canola oil)- unsaturation refers to the double bonds.
- Trans double bonds can also be generated in fats, which are then called trans fats.
- Hydrogenation give saturated fats (**unsaturation removed**)



Major component of margarine

A solid saturated fat (margarine)

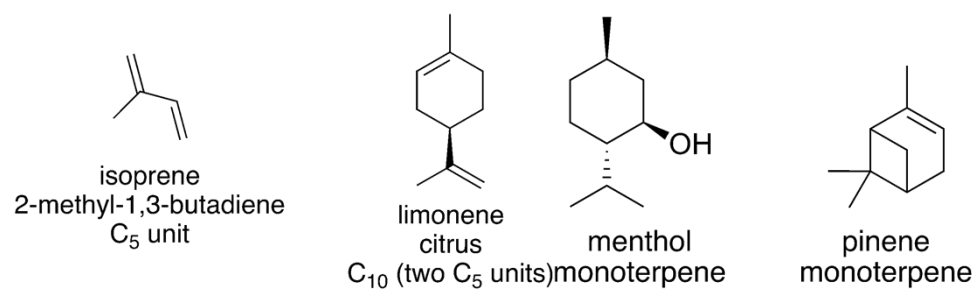
This molecule has greater London dispersion forces, cause it to exist as a solid



Diacetyl

Butter flavoring that adds a yellow color

Natural Products Containing Alkenes: Terpenes



1 C₅ Hemiterpene

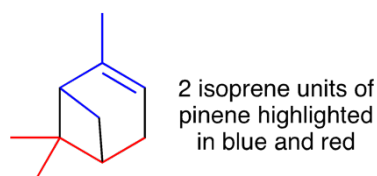
2 C₅ Monoterpene

3 C₅ Sesquiterpene

4 C₅ Diterpene

5 C₅ Sesterterpene

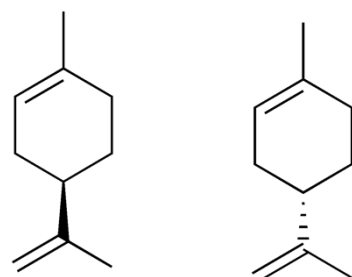
6 C₅ Triterpene



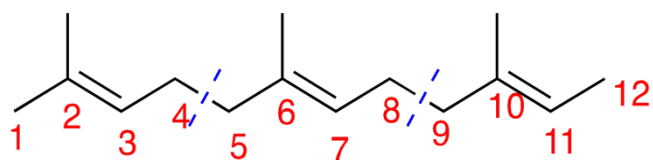
- Steroids are made from triterpenes

-Pinene is made from two isoprene units

Examples:



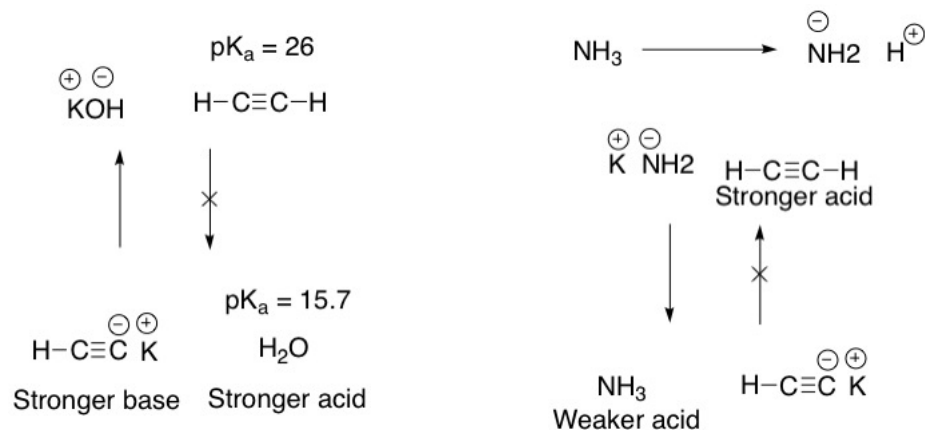
Enantiomers of Limonene



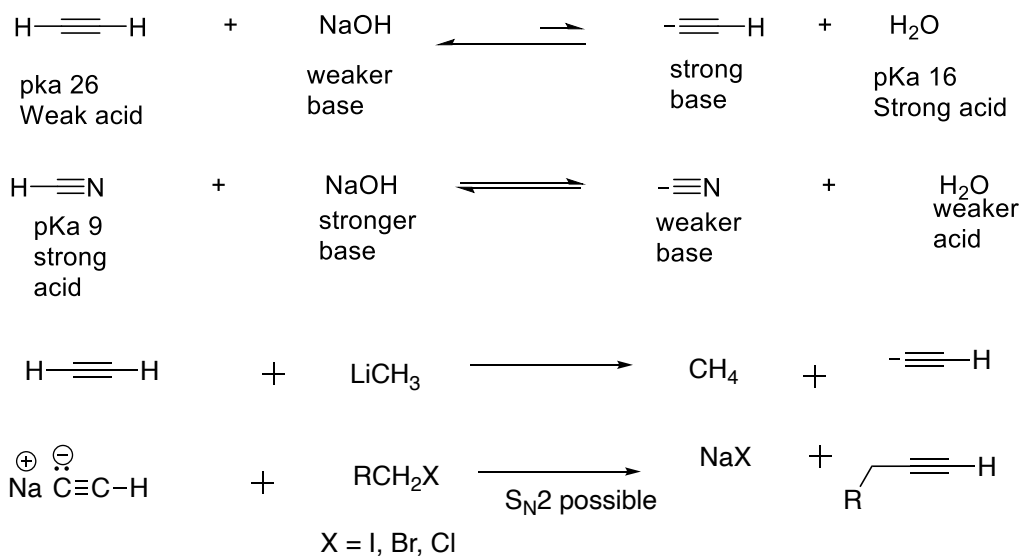
2,6,10-trimethyldodeca-2,6,10-triene

2,6,10-trimethyl-2,6,10-dodecatriene

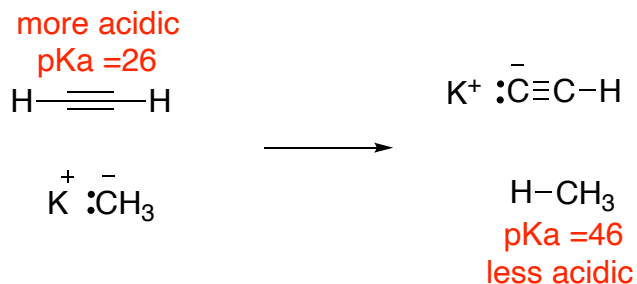
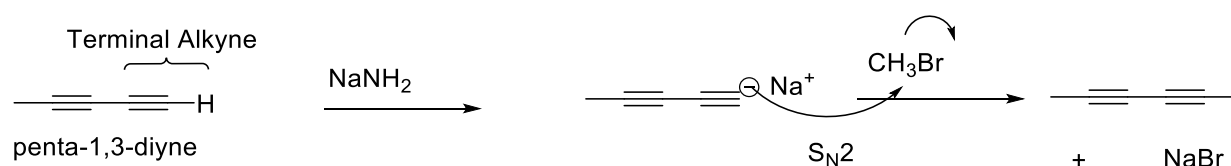
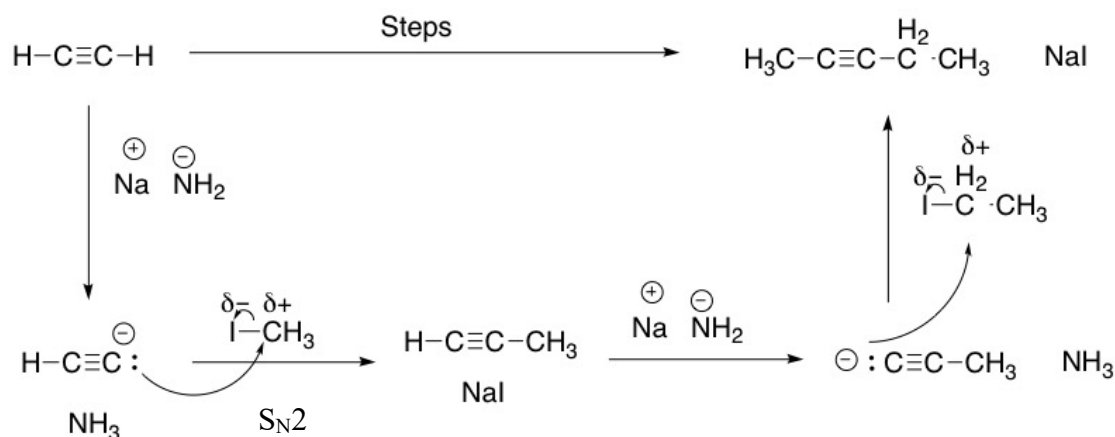
Deprotonating acetylenes



KOH will not deprotonate acetylene because it is a weaker base than acetylenes conjugate base (acetylide).



- KNH_2 will deprotonate acetylene, as the resulting acetylide is a weaker base. Ammonia pK_a is 36. Other bases such as NaCH_3 can also be used to deprotonate acetylene.

More Example**Example:****Organic synthesis example:**

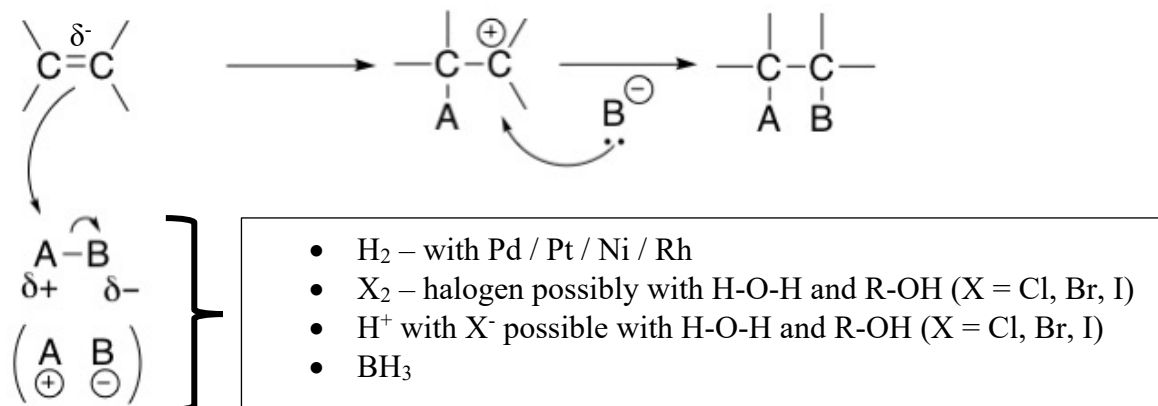
Both substitution reactions involving methyl iodide and ethyl iodide are S_N2, as the primary and secondary carbons will not hold the positive charge that is characteristic of an S_N1 intermediate (tertiary carbocation).

HCN vs C₂H₂

- HCN is more acidic with a pKa of 9.0 due to the N atom being more electronegative than C atom (**Note:** the N atom is pulling the electron density away).

Addition to Alkene and Alkynes Reaction:

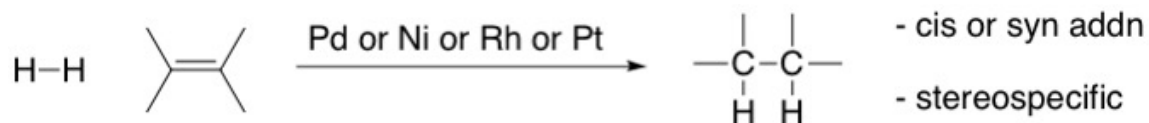
- Large amount of negative charge concentrated on the π -bond (δ^-). An **electrophile**, a species that seeks negative charge (electron-loving), would then get attacked by the electrons in the π -bond, hence forming a new bond.

General Mechanism

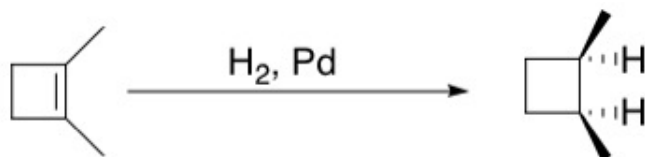
A is an electrophile – seeks electrons

B is a nucleophile – seeks nucleus

Alkene = olefin

Hydrogenation Addition of H_2 

This reaction is **stereospecific**, meaning that the stereochemistry of the starting material determines the stereochemistry of the product (in this reaction, **cis**). Needs a catalyst for the reaction to proceed. The metals palladium (Pd), nickel (Ni), rhodium (Rh), and platinum (Pt) act as catalysts to facilitate this reaction.

Hydrogenation examples**Example 1:** 1,2-dimethylcyclobutene

1,2-dimethylcyclobutene

cis-1,2-dimethylcyclobutane

The hydrogenation can occur from the top or the bottom, which in this case produces the same product (*cis* isomer of 1,2-dimethylcyclobutane). The starting material is achiral, and the product is a **meso compound** (two stereogenic centers, but a plane of symmetry)