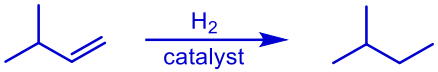
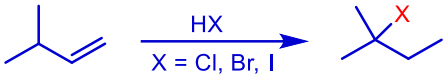
Alkene Reactions

- **Hydrogenation**



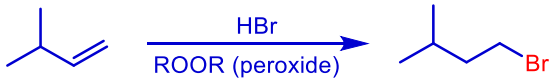
Catalyst: Pt, Ni, Pd/C,
Wilkinson's catalyst $Rh(PhP)_3Cl$

- **Addition of HX** (Markovnikoff, syn + anti, H+ shift): carbocation mechanism

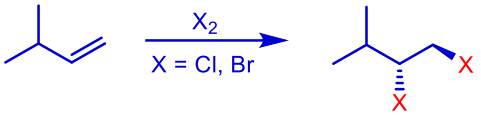


Note: alkene with a chiral center
=> Mixture of diastereomer

Anti-Markovnikoff
Radical mechanism

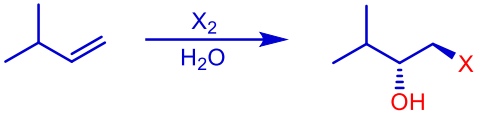


- **Halogenation** (anti): bromonium ion mechanism



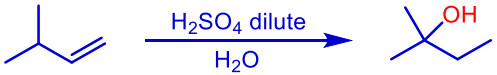
(inert) solvent: CCl_4, CH_2Cl_2, $CHCl_3$, hexane,...

- **Halohydrin Formation** (+ HO-X) (Markovnikoff, anti): bromonium ion



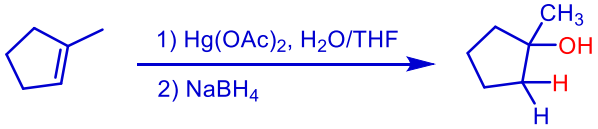
If solvent is: RO-H => ether
HO-H => halohydrin

- **Acid-catalyzed hydration** (Markovnikoff, syn+anti, H+ shift): carbocation



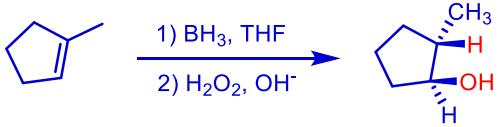
If solvent is: H_2O => alcohol
ROH => ether

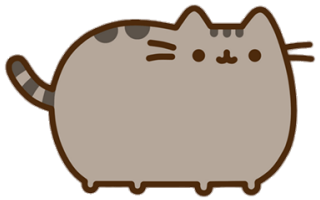
- **Oxymercuration - Reduction** (Markovnikoff, anti, NO H+ shift): mercurium ion



If solvent is: H_2O => alcohol
ROH => ether

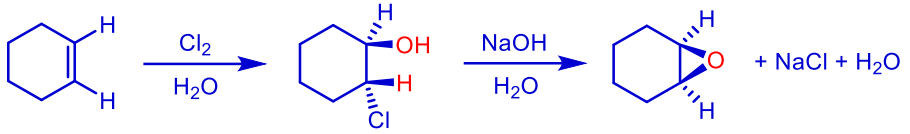
- **Hydroboration - Oxidation** (anti-Markovnikoff, syn)



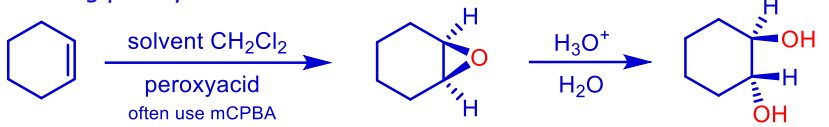


- **Epoxidation** (syn)

+ using halohydrin



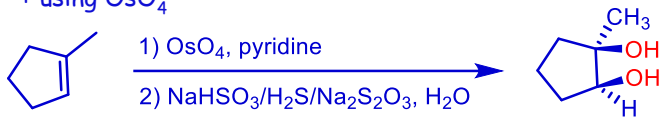
+ using peroxyacid RCOOOH



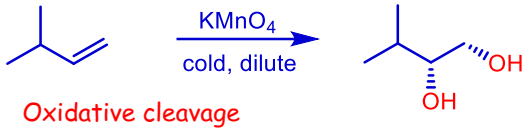
Dihydroxylation (anti)

- **Dihydroxylation** (syn)

+ using OsO_4

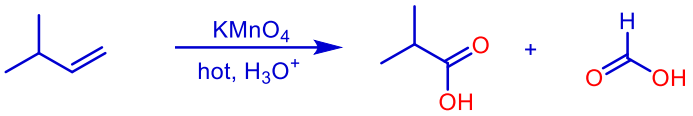


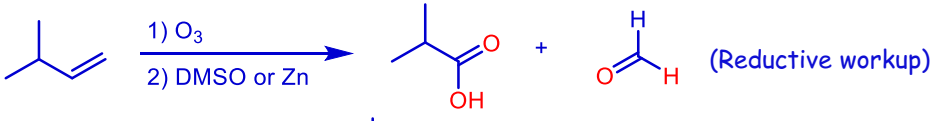
+ using $KMnO_4$



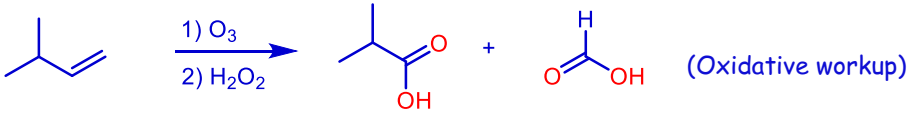
If heat or add acid:
Diols => carbonyl

- **Oxidative cleavage**



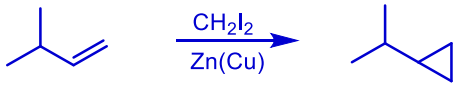


(Reductive workup)

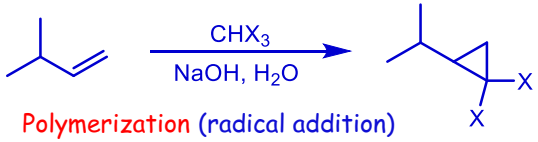


(Oxidative workup)

- **Cyclopropanation** (addition of carbene)



(Simmons – Smith Reaction)
Zn(Cu): carbenoid



- **Polymerization** (radical addition)