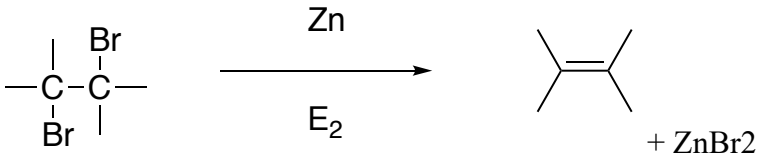
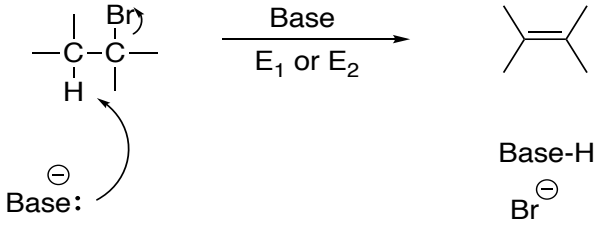
Recall:

Types of Elimination Reactions:

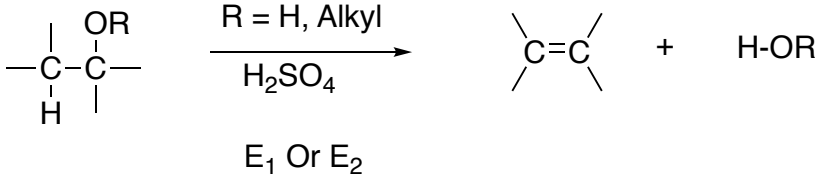
1) Dehalogenation



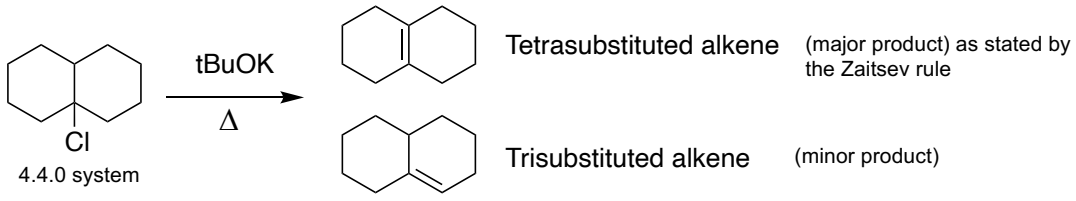
2) Dehydrohalogenation



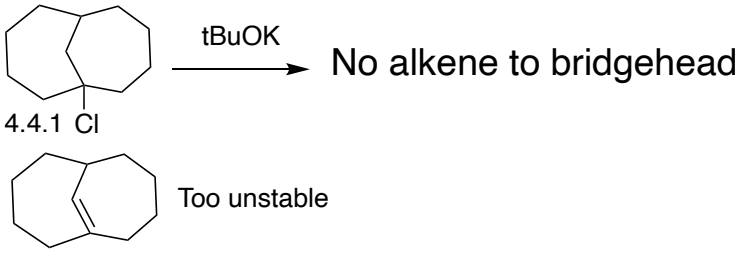
3) Dehydration



Example 1:

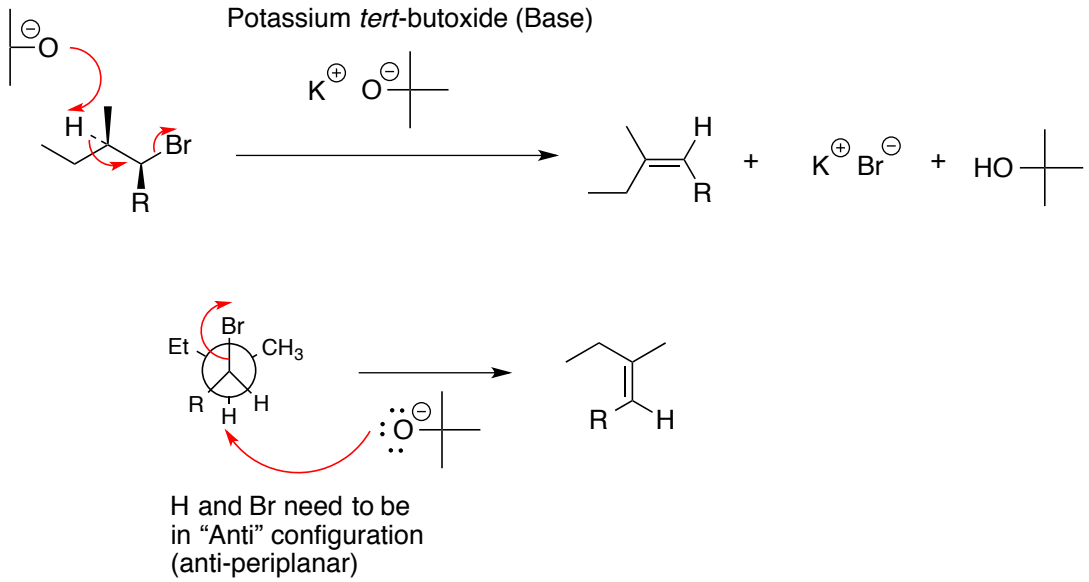


Example 2:

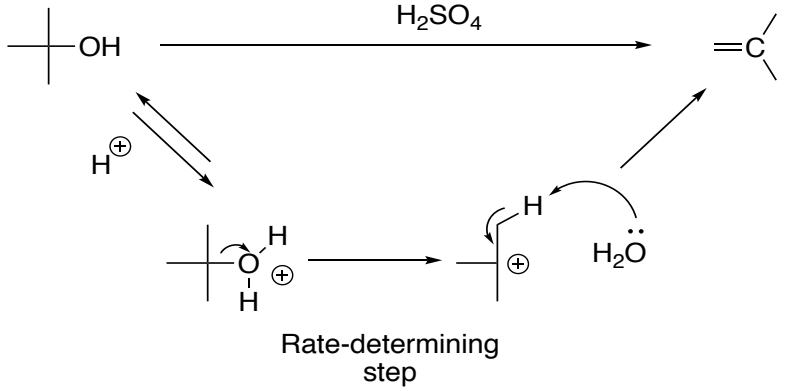


Bredt Rule: Bridged alkenes are only okay if one of the bridges is a "zero" (0) bridge in small rings <9

Example 3:



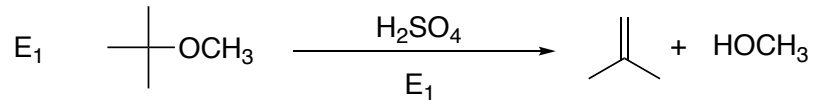
Example 4:



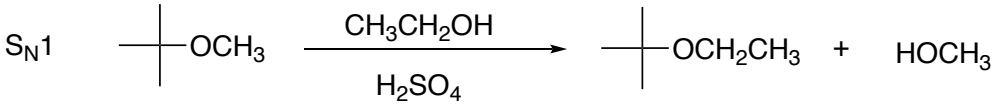
Elimination vs Substitution

Substitution	vs.	**Elimination**
- Low Temp		- High Temp
- Weaker Base		- Stronger Base
- Dilute H^+		- Conc. H^+
- Leaving group on 1º carbon		- 2º, 3º
- Small Nucleophile		- Large Nucleophile

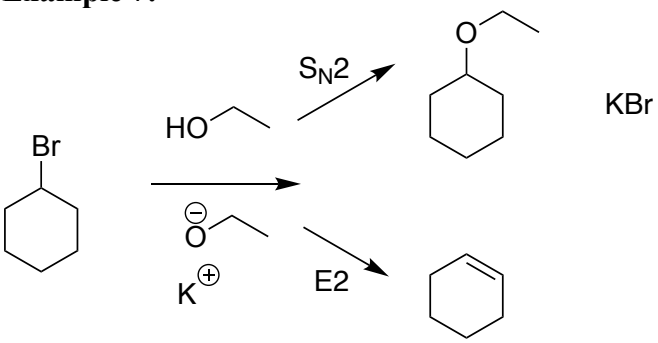
Example 6:



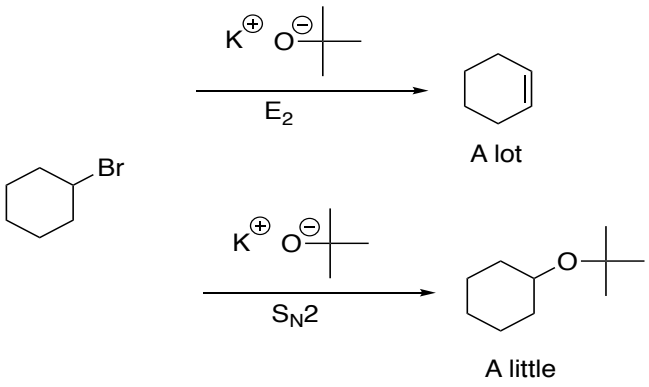
vs.



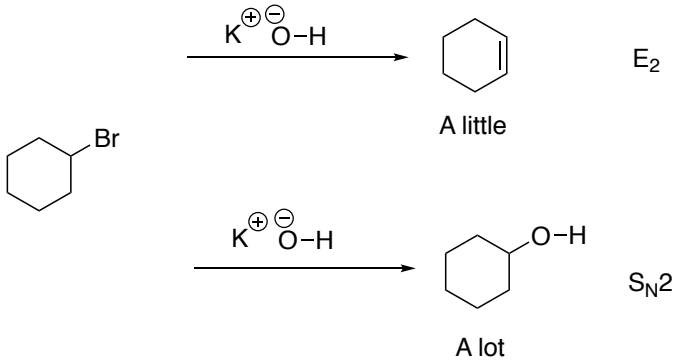
Example 7:



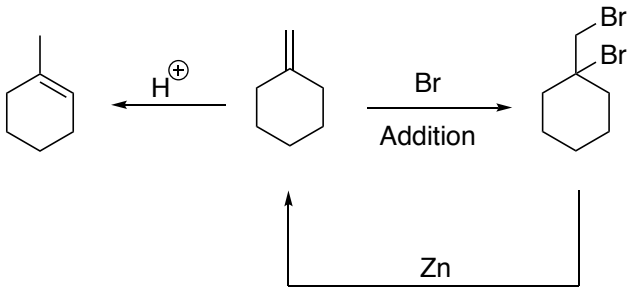
Example 8: bulky nucleophiles/bases favor elimination



Example 4: small nucleophiles/bases favor substitution



Example 9:

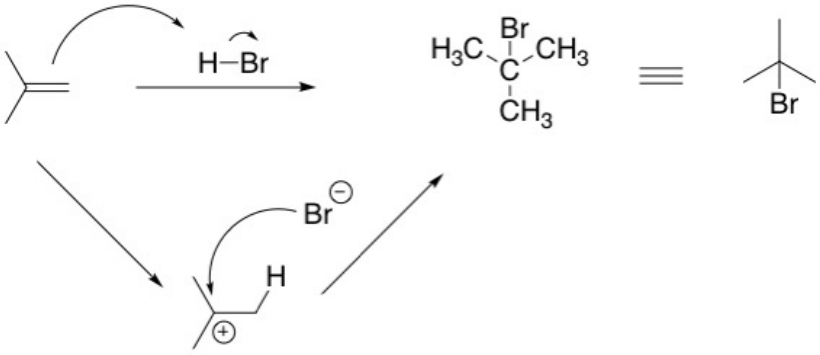


Due to mechanism of Zn, the double bond is stuck at less substituted end.

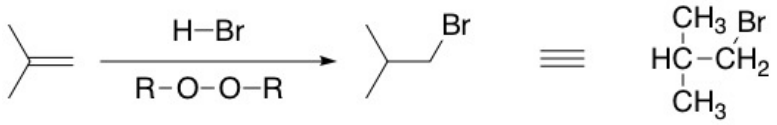
Double bond can go to more substituted if it is left in acid

<u>Recall</u>:

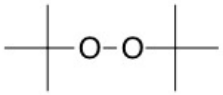
Addition Reactions of Alkenes



For alternate regiochemistry (addition of Br onto the less substituted carbon) need dialkyl peroxide (radical addition)

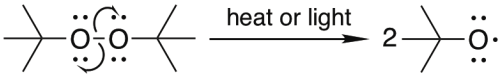


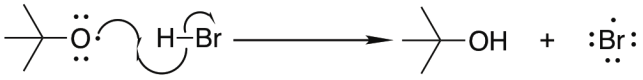
Examples of peroxides

Tert-butyl peroxide 

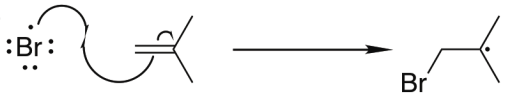
Hydrogen peroxide HO–OH

Radical mechanism

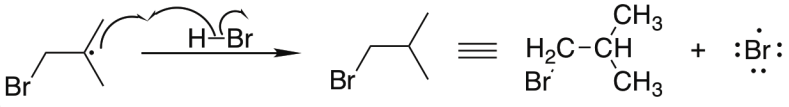
Initiation 



O-Br bond is not strong as both atoms are electron withdrawing elements. Therefore, *tert*-butyl alcohol is formed

Propagation 

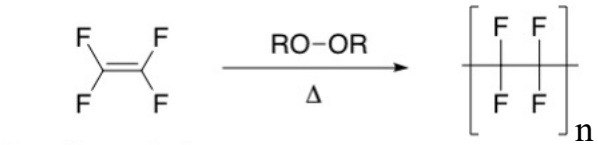
Radical forms on that carbon with the maximum number of alkyl groups attached: radicals are electron deficient and electron-donating substituents stabilize them



Polymers

Poly = many
Meros = parts

Teflon (Polytetrafluoroethylene)

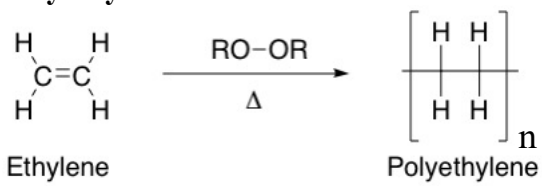


Tetrafluoroethylene
Toxic gas

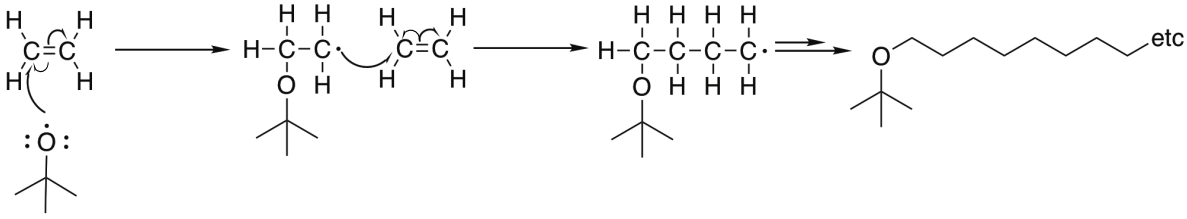
Teflon

Teflon is very unreactive and does not adhere substances
Many polymers degrade into their components if heated enough, and can further decompose.

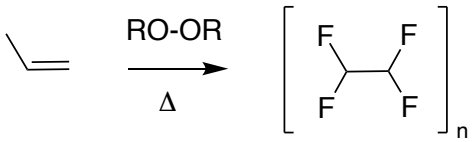
Polyethylene



Mechanism:

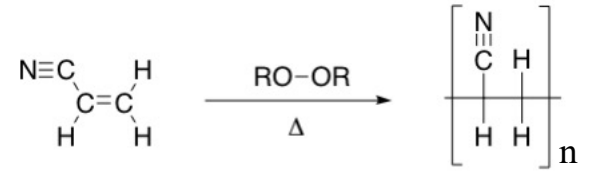


Polypropylene



Propylene. Polypropylene

Polyacrylonitrile



Acrylonitrile

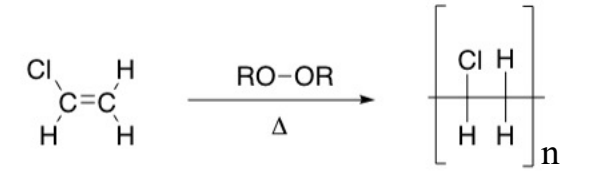
Polyacrylonitrile/ orlon

Found in carpets

C≡N
Nitrile or cyano group

Polyacrylonitrile can form HCN if it is heated to decomposition.

Polyvinyl chloride

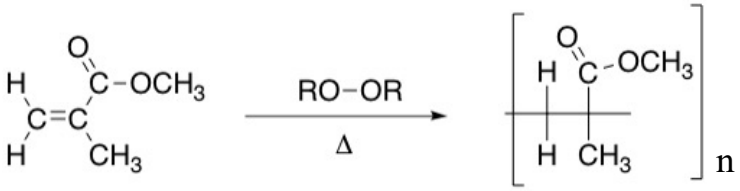


Vinyl chloride

Polyvinyl chloride (PVC)

Such polymers containing chloride can form HCl if decomposed.

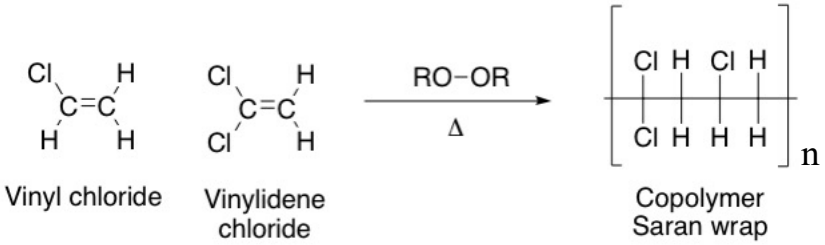
Lucite (polymethyl methacrylate) (aka acrylic glass / plexiglass)



Lucite

Found in windshields

Copolymers



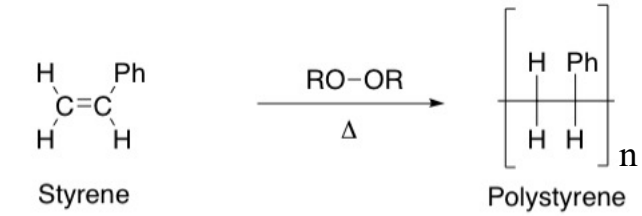
Vinyl chloride

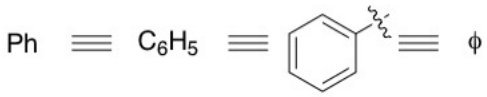
Vinylidene chloride

Copolymer Saran wrap

Copolymers are composed of two different subunits.

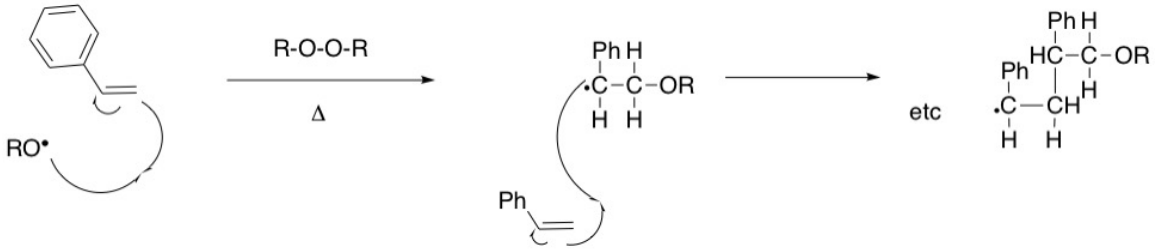
Polystyrene



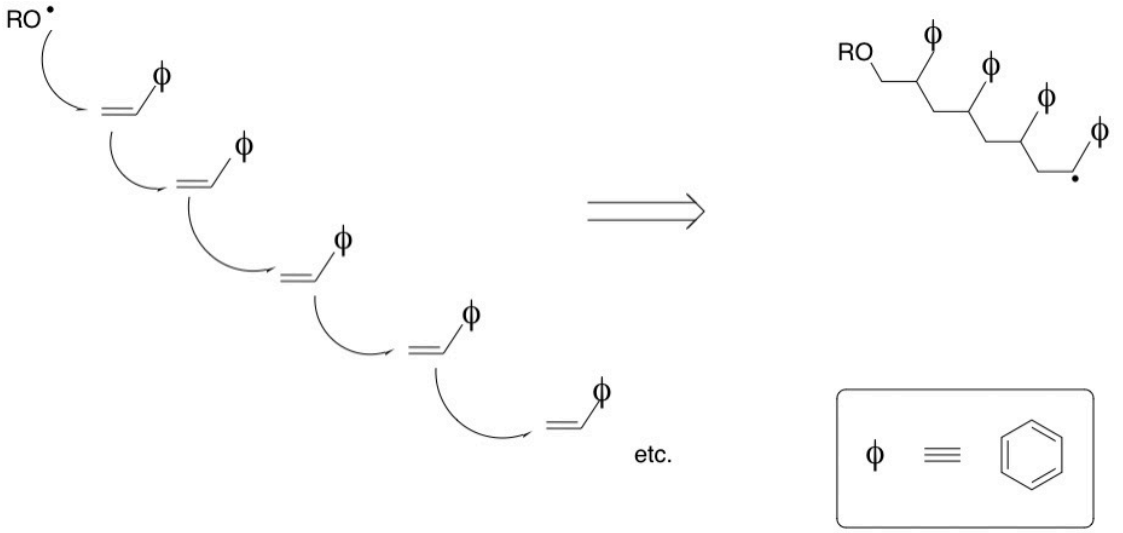


Ph = phenyl group

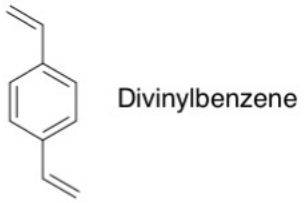
Example: Mechanism of polystyrene formation

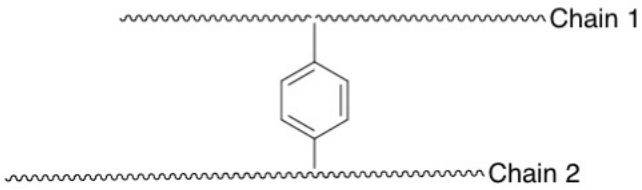


Short-hand for mechanism of polystyrene formation



Divinyl benzene can be added as a cross-linker so chains link on both of its double bonds This make the copolymer more solid (as you encounter in many products) – typically about one part in 100 to one part in 6 of divinylbenzene may be added





Examples of Biopolymers

1. Polysaccharides
   - polymers of sugars

2. Proteins and peptides
   - polymers of amino acids

3. Nucleic acid polymers (DNA and RNA)
   - polymers of nucleotides

4. Fats and polyketides
   - polymers of fatty acids

5. Polyisoprenoids/terpenoids
   - polymers of isoprene (i. e. natural compound rubber)