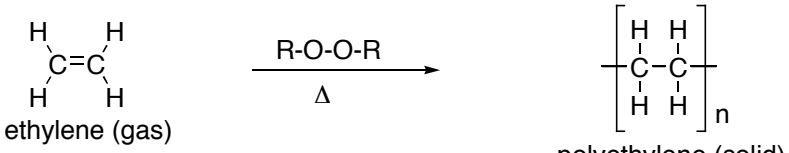
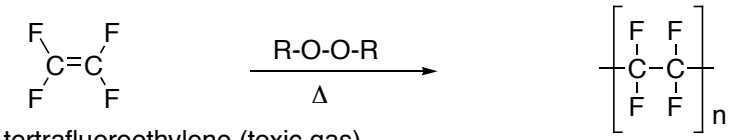
1. Polyethylene:



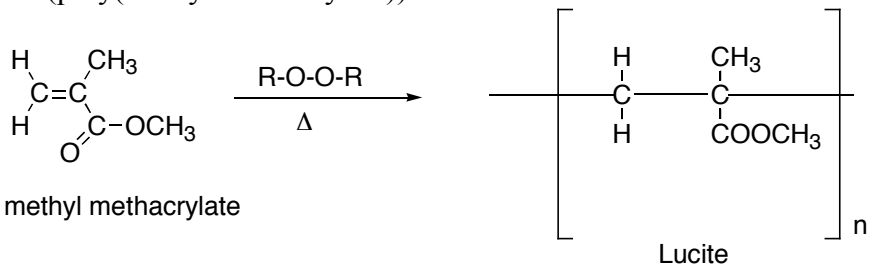
ethylene (gas) polyethylene (solid)

2. Teflon:



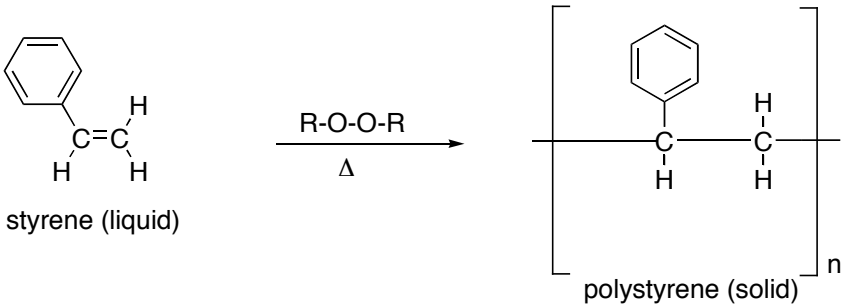
tertrafluoroethylene (toxic gas) Teflon (solid)

3. Lucite (poly(methyl methacrylate)):



methyl methacrylate Lucite

4. Polystyrene:

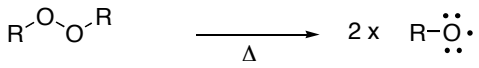


styrene (liquid) polystyrene (solid)

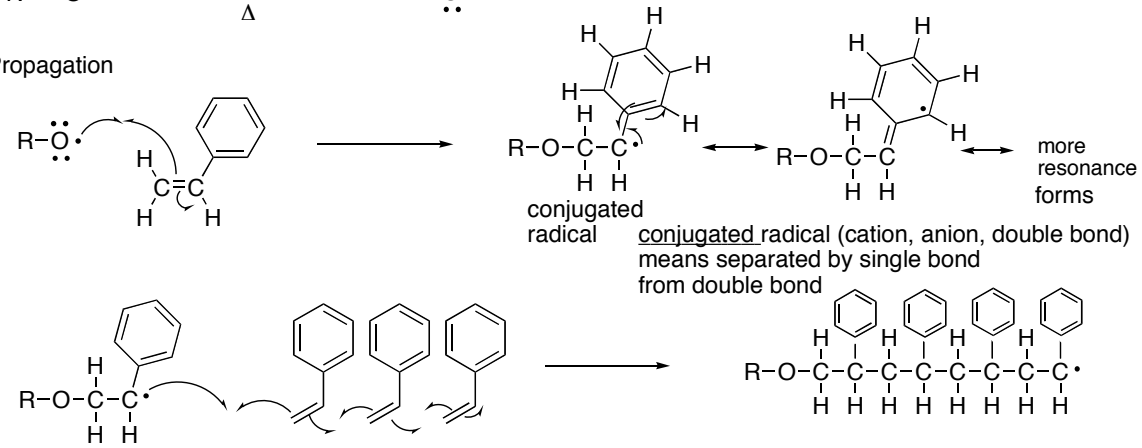
Mechanism:

1. Radical catalyzed polymerization

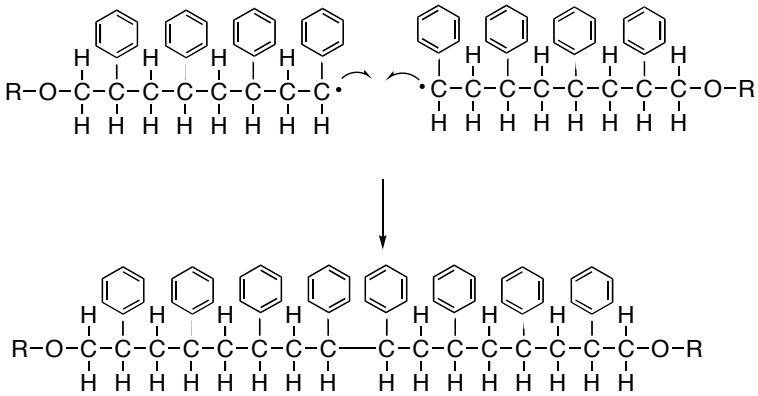
Initiation:



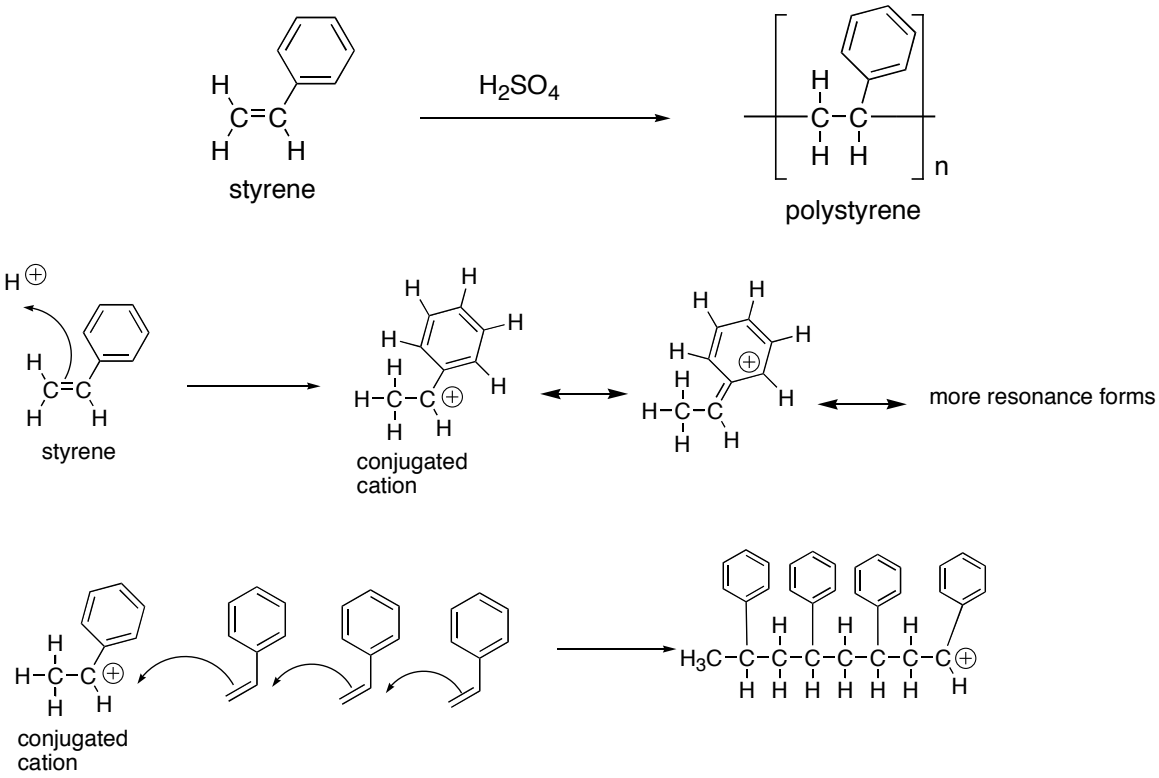
Propagation



Termination

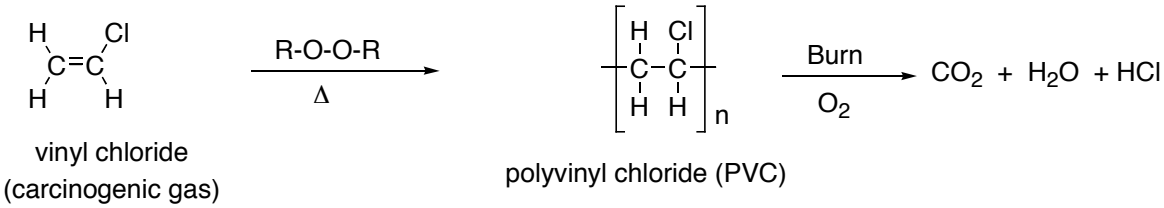


2. Acid catalyzed polymerization

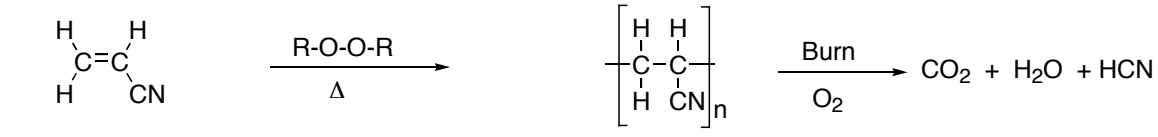


More Polymers:

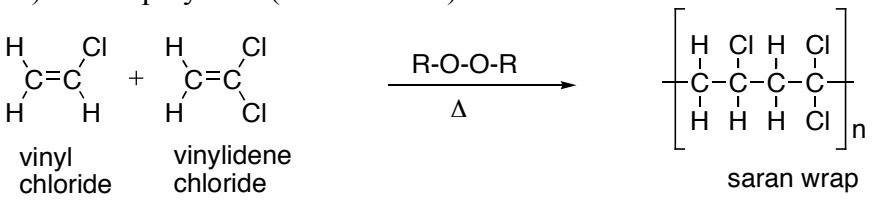
i) Polyvinyl chloride (PVC)



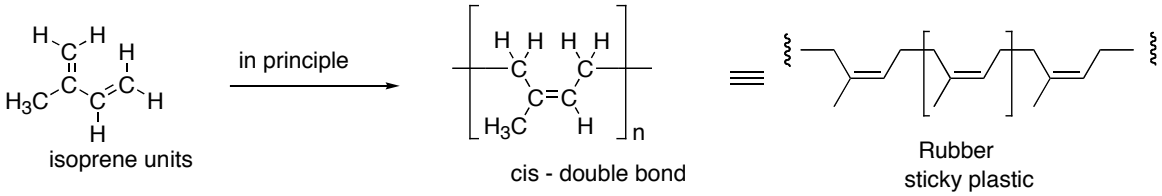
ii) Polyacrylonitrile (Orlon)



iii) co-polymers (2 monomers)



Rubber : commercial source is rubber trees (*Hivea brasiliensis*)

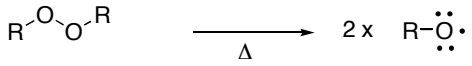


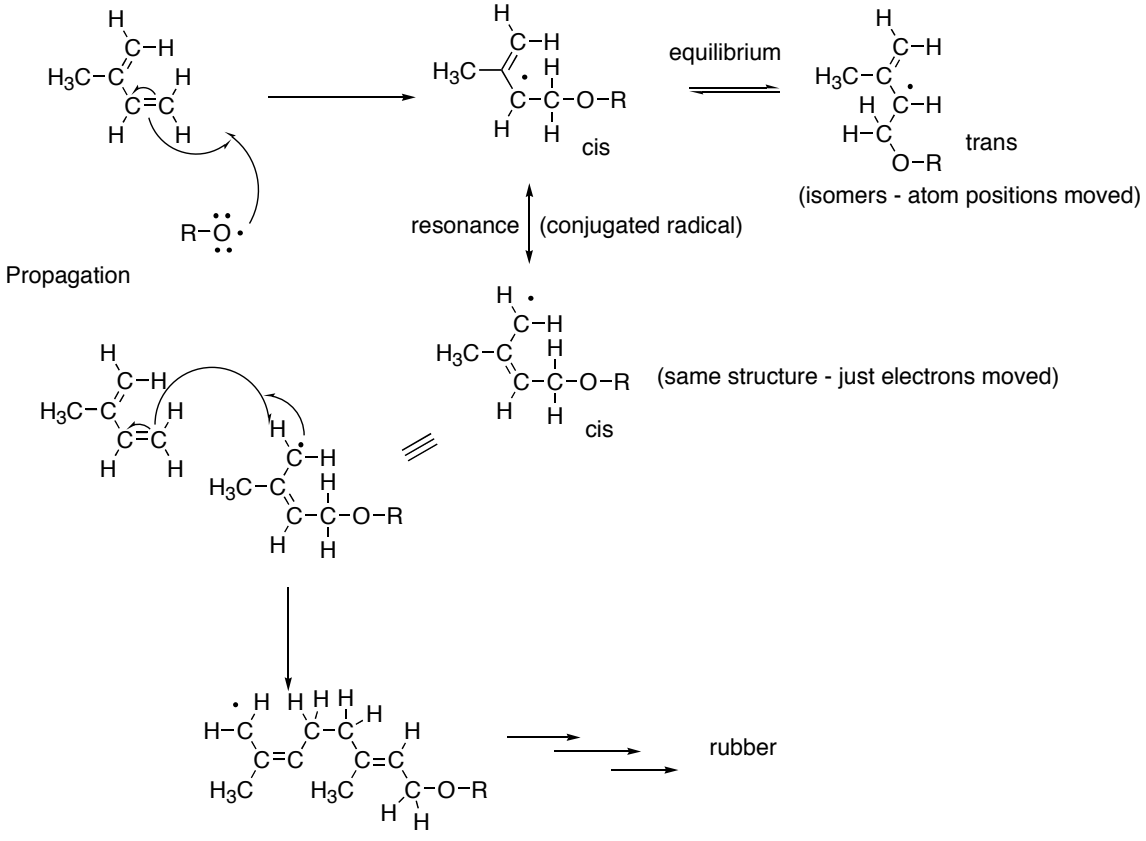
- Charles Goodyear – vulcanized rubber in 1839

rubber + carbon + sulfur + (heat) → vulcanized rubber (elastic properties)

Mechanism for polymerization:

Initiation:





Stereochemistry and Chirality:

Chiral object (molecule):

- has non-superposable (non-superimposable) mirror image

Enantiomers:

- molecules that are stereoisomers and are non-superposable mirror images of each other

R and S designation of stereoisomers:

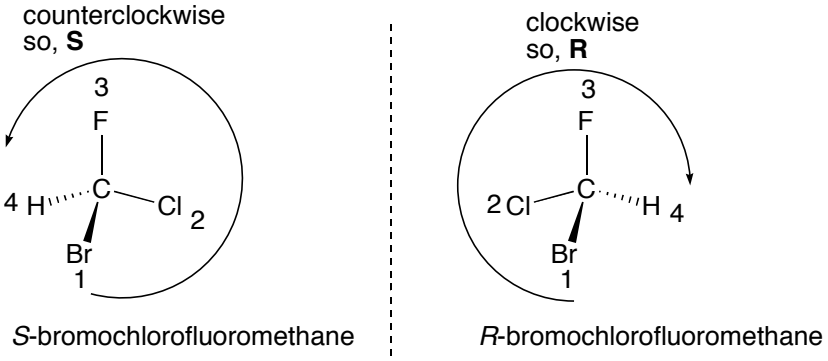
- R = Rectus
- S = Sinister

Stereogenic centre:

- often tetrahedral atom (carbon) with four different groups attached to it

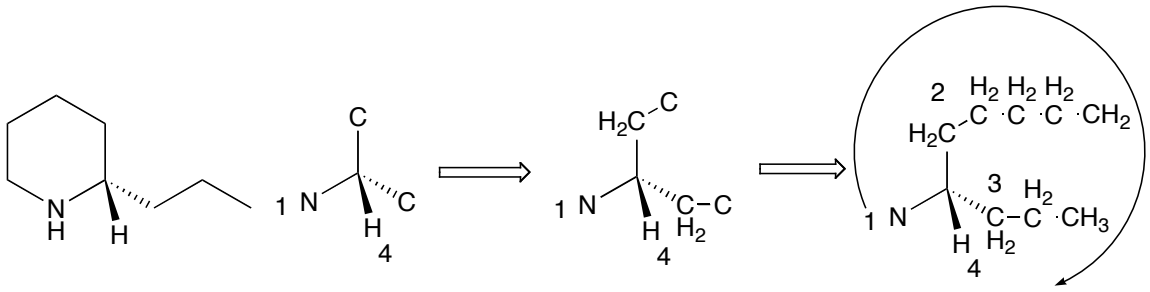
Labeling a stereogenic centre as R or S:

- assign priority based on atomic number (similar to *E* and *Z*)
- if cannot decide, go to next set of atoms
- smallest group pointing back, count 1, 2, 3:
  clockwise → R configuration, counterclockwise → S configuration



S-bromochlorofluoromethane

R-bromochlorofluoromethane



- 1,2,3 count is clockwise, BUT the smallest group is pointing forward, so the configuration is opposite of what you get if smallest group back
- in this case, the configuration of stereogenic centre is **"S"**

(*S*)-2-propylpiperidine (or (*S*)-coniine)

- *S*-isomer is toxic (hemlock), but *R*-isomer is not active