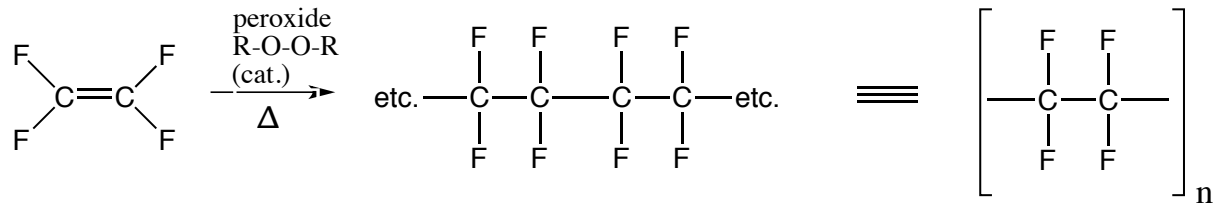
Review: Polymers

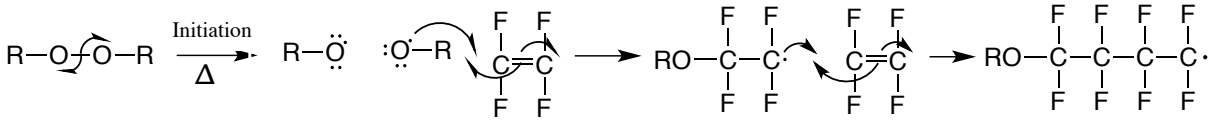
Teflon: Polytetrafluoroethylene



tetrafluoroethylene
toxic gas

Teflon
MW > 1 million

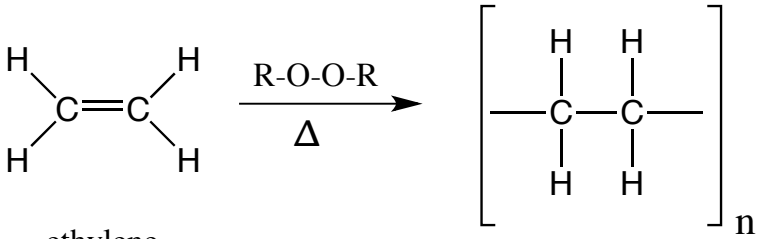
Polymerization Mechanism



Termination occurs when two radicals come together and form the long chain.

PE: Polyethylene

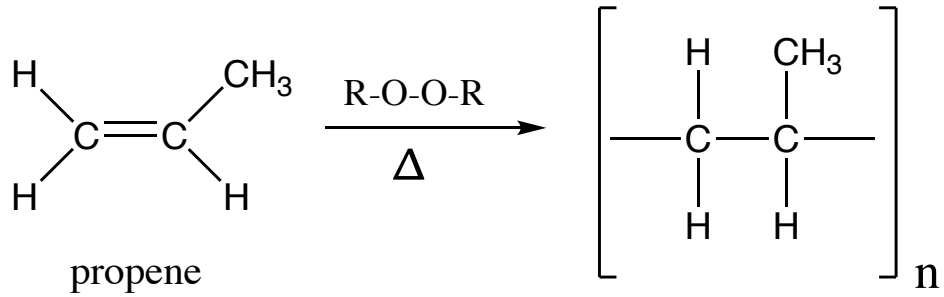
**know this structure*



ethylene

polyethylene

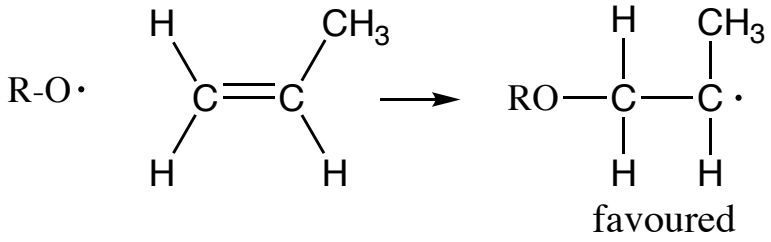
Polypropylene:



propene
propylene

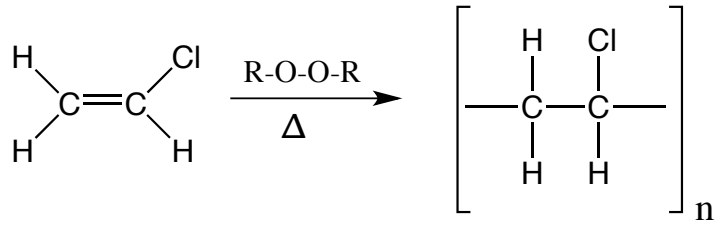
polypropylene

Is the above notation representative of the structure? Or can the methyl group be located at another position? Radical (electron deficient species) forms at most highly substituted carbon (most alkyl groups) due to inductive electron donating effect



PVC: Polyvinyl chloride

**know this structure*

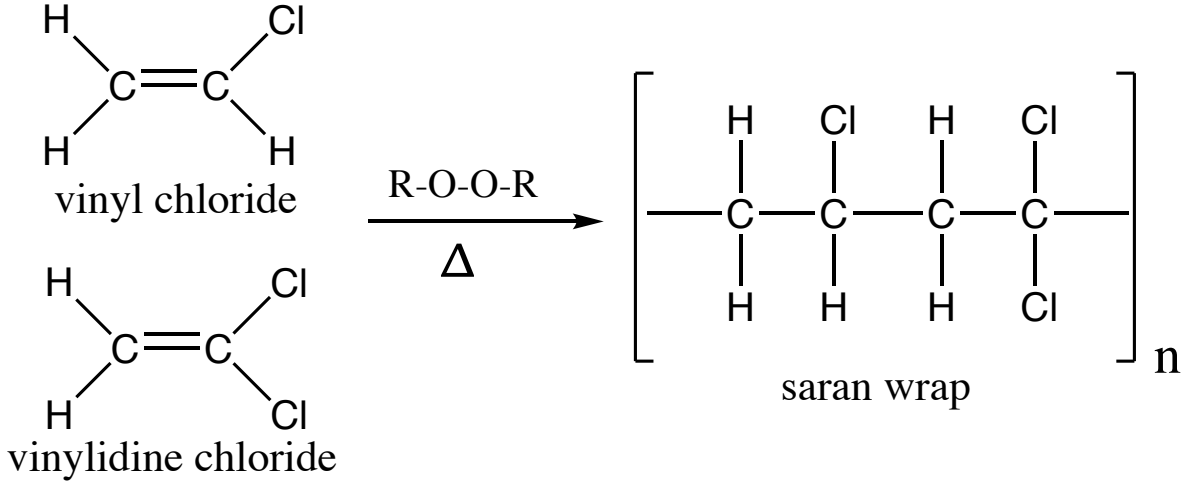


vinyl chloride

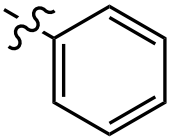
polyvinyl chloride
PVC

Co-polymers: use 2 monomeric units that repeat instead of just 1

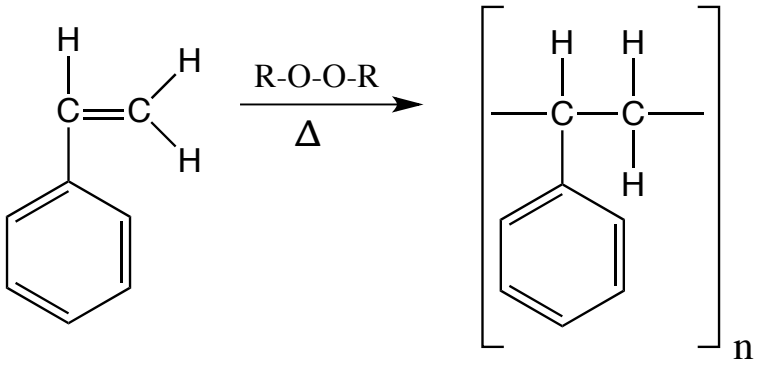
Saran Wrap



Aside: C_6H_5 is a very common aromatic substituent in organic chemistry. It is called a **phenyl group** (not to be confused with benzyl which is C_7H_7 and has an extra CH_2). The phenyl group has multiple notations: Ph or Φ)

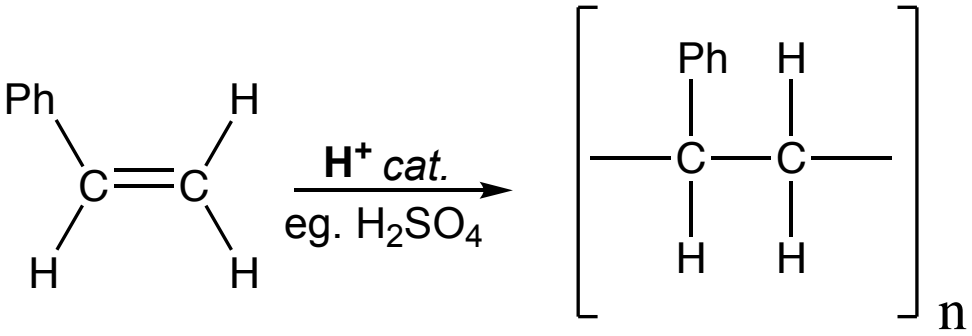


Polystyrene:

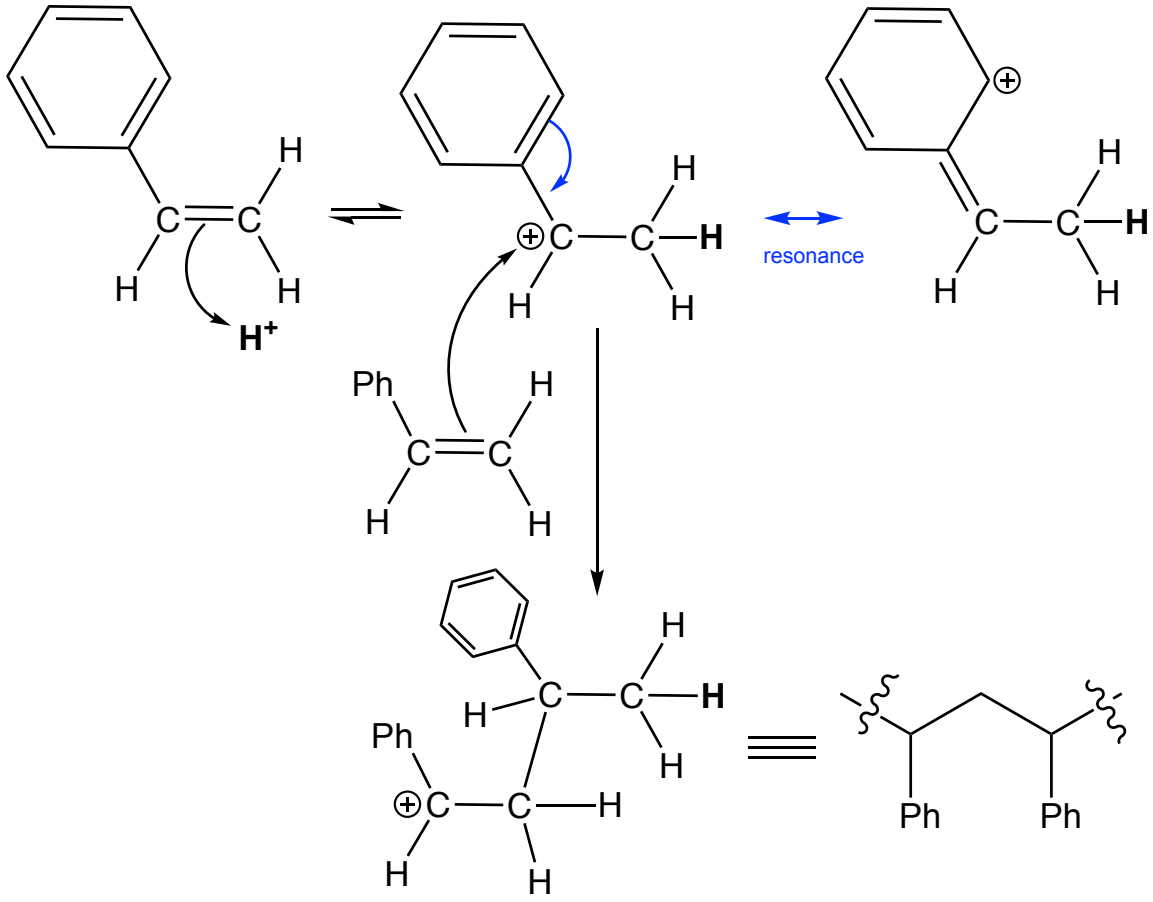


styrene polystyrene

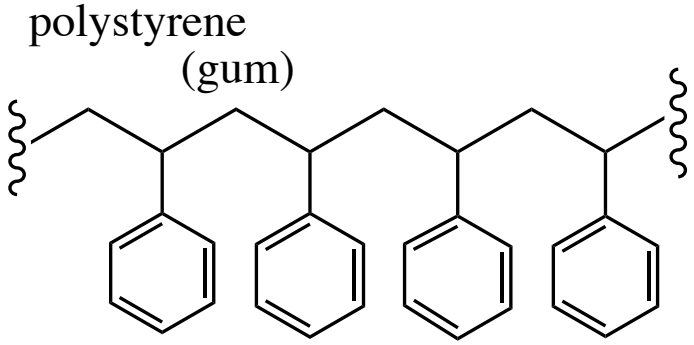
Cationic Polymer



A strong acid acid, such as sulfuric acid, is required to catalyze this reaction. The mechanism can be found on the following page.

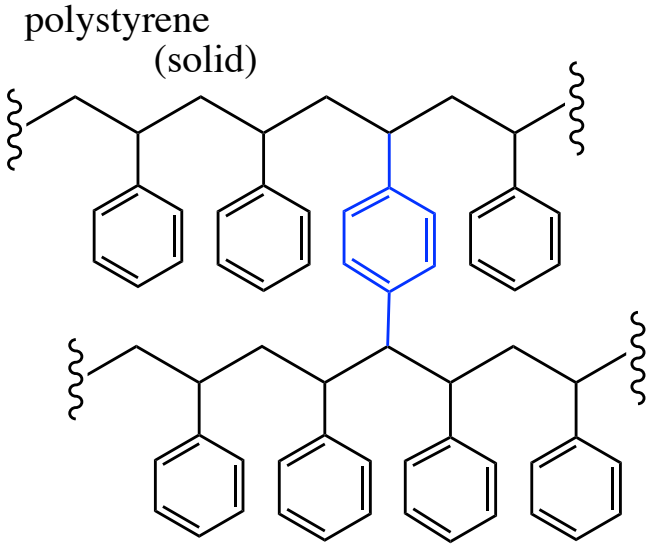


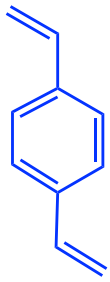
Another way to draw this polymer is shown below (it is a sticky gum-like substance):



Crosslinking

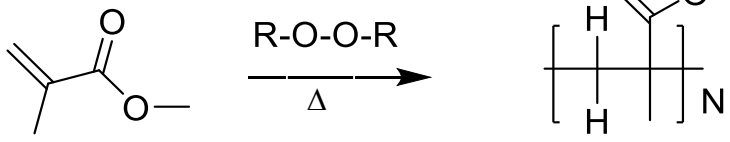
Using vinyl benzyl groups to link strands of polystyrene together creates solid and more usable form of polystyrene.





vinyl benzyl
used as a
cross-linker

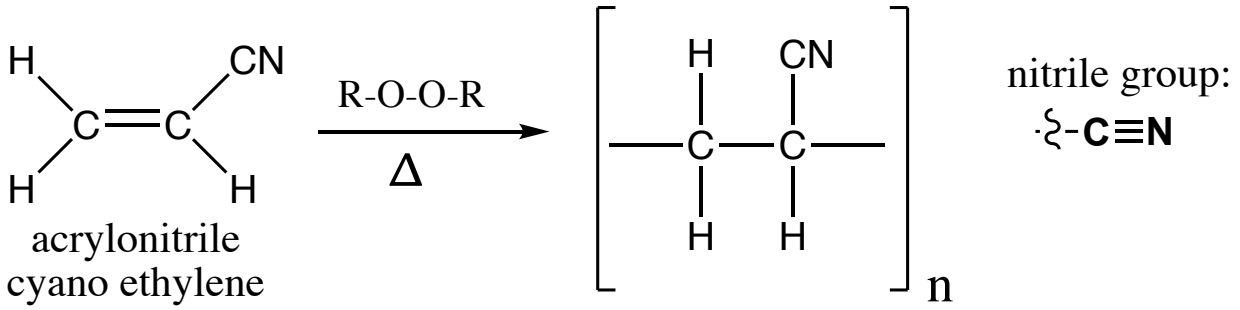
Lucite: (Plexiglas)



Methyl Methacrylate

Lucite

Orlon polyacrylonitrile



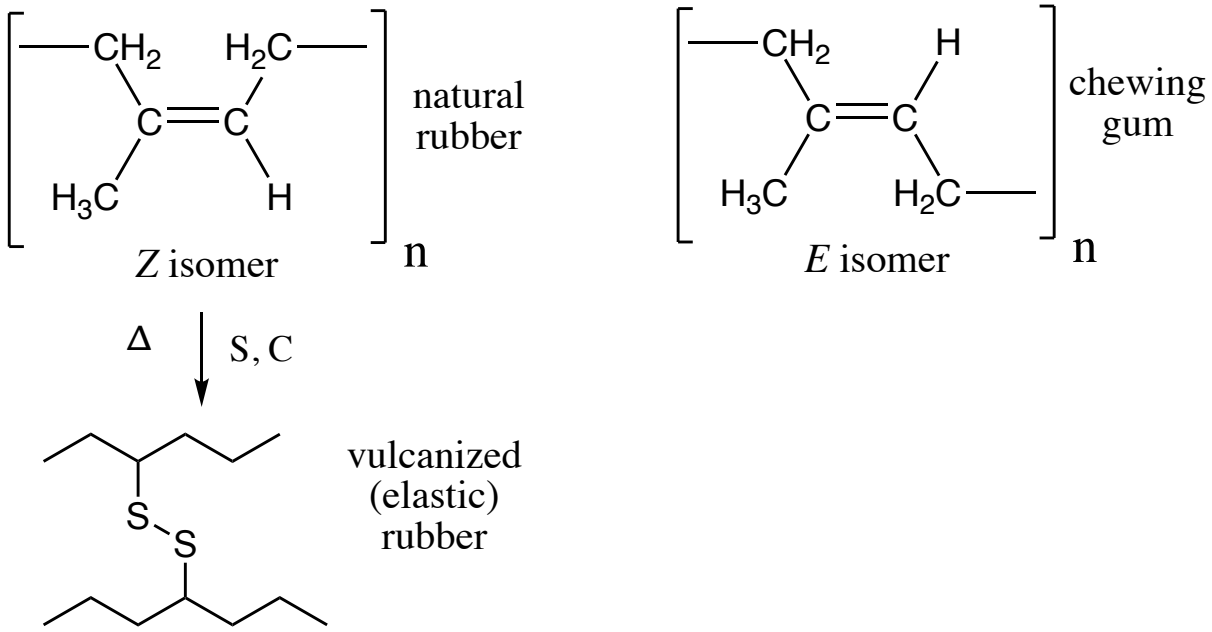
acrylonitrile
cyano ethylene

nitrile group:
-C≡N

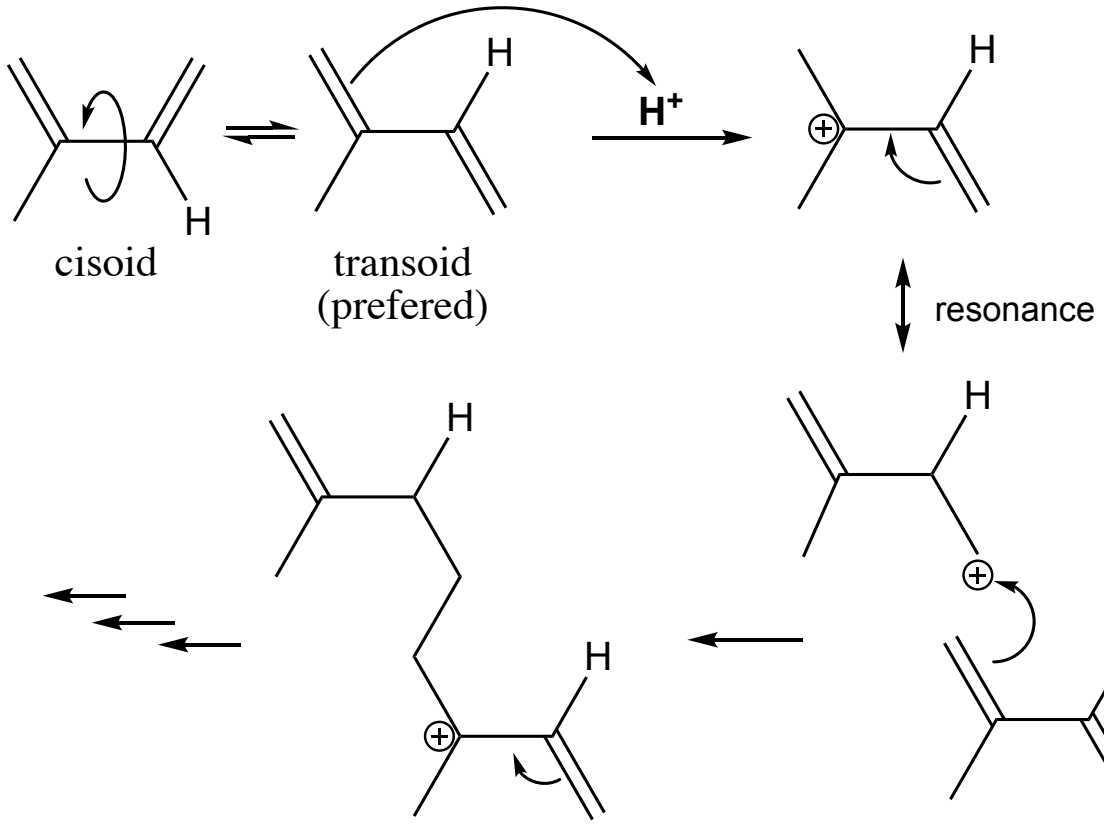
orlon polyacrylonitile (in carpets!)

Natural rubber

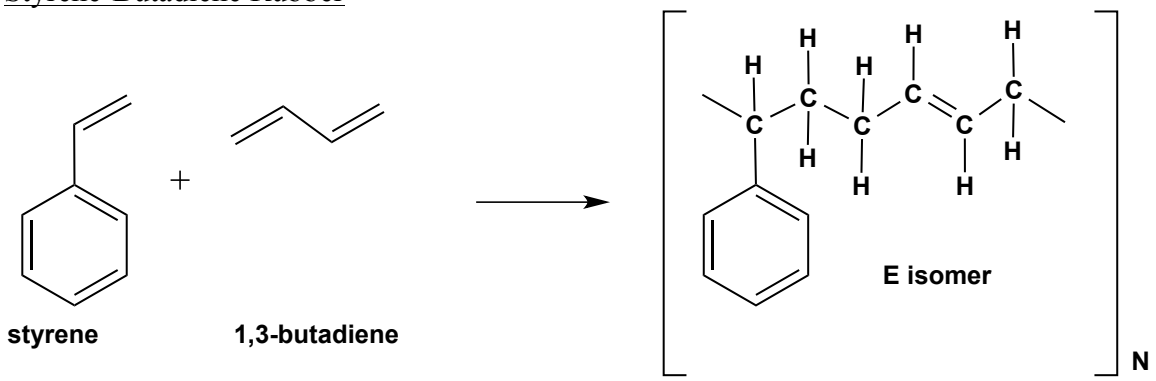
Obtained from *Hevea brasiliensis*, commonly called the rubber tree



How is this made?



Styrene-Butadiene Rubber



Styrene butadiene rubber (SBR)

Alcohol Nomenclature

Be aware of the differences between:

Alcohols & Carboxylic Acids

Ethers & Esters

-OH group can be named:
- alcohol
- hydroxyl
- hydroxy

Steps:
1. Find the longest chain, with the OH attached (as it takes priority over other groups)
2. Number in such a way to give the OH the lowest number
3. Drop the "e" of the alkane name, add "ol"

Examples

CH_3OH – methanol
- Highly toxic as the body converts it to formaldehyde

CH_3CH_2OH – ethanol