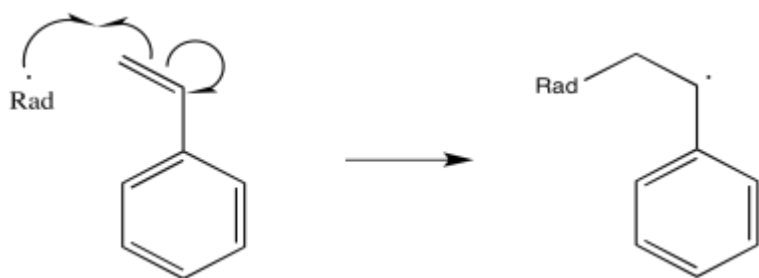


RADICAL POLYMERISATION

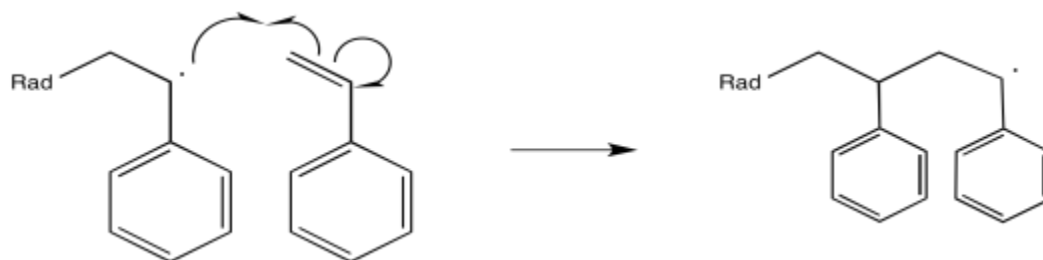
Radical addition to alkenes can be applied to the production of macromolecules. Like other polymerisation reactions involving alkenes, it involves the formation of a reactive intermediate by the action of an initiator on an alkene. A chain reaction results in which other alkenes are enchainned into a polymer.

The term "initiator" here is used in a slightly different way than we have used it with other radical reactions. The radical initiator has already undergone its reaction to form a radical. That radical then initiates chain growth. This step is really a propagation step in terms of types of radical elementary reactions, because one radical leads to a new radical.

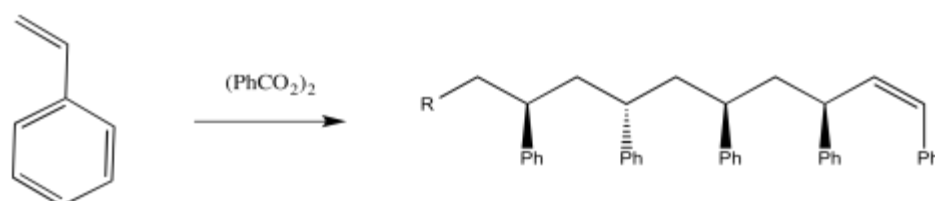
Polystyrene is one example of a material that is frequently prepared via radical conditions. During the reaction, a radical adds to the double bond of the alkene.



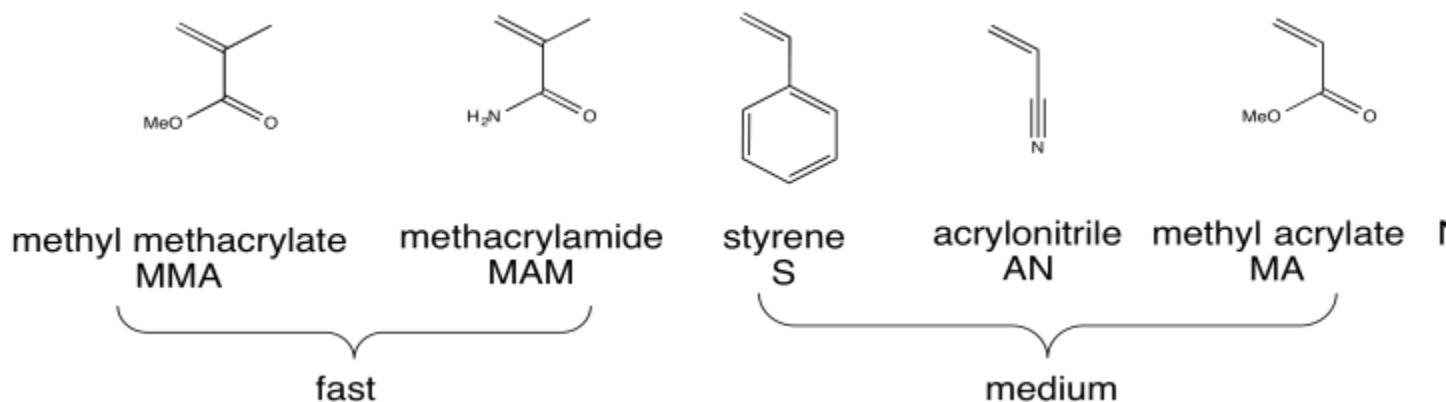
The newly-formed radical, in regular alkene addition, would then react with something to abstract an atom and achieve stable, closed-shell configuration. However, in a polymerisation reaction, alkene molecules are intentionally packed closely together. Either they are very concentrated in solution or else they are neat (with no solvent at all). As a result, the newly-formed radical just gobbles up another alkene.



There are lots of ways to carry out this reaction. One way would be to take some styrene, heat it up until it melts, and add some benzoyl peroxide.



Radical polymerisation is a critical method of preparing polymers. The figure below shows a number of monomers that are commonly polymerised under radical conditions.



Source: <http://employees.csbsju.edu/cschaller/Reactivity/radical/radicalpolymerisation.htm>