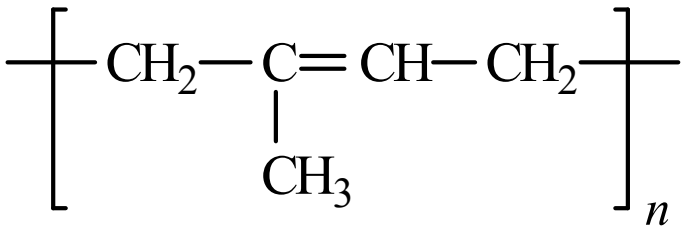
Rubber Concept: Natural Rubber

"Natural rubber" is a elastomer material. For man-made rubber materials is used synthetic rubber. Natural rubber is also a thermoplastic. In addition, the rubber can be vulcanized, and then it is a thermotetting polymer. Because, in this case, vulcanized rubber is degraded but not destroyed with heating.

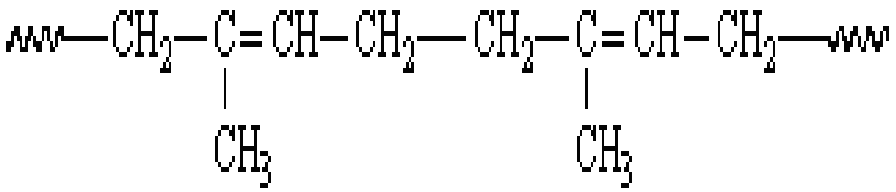
Natural rubber, is also called **caucho** or **caoutchouc**. The chemical structure of natural rubber consists of polymers of the isoprene organic compound. In natüre, rubber can be prepared from the form of the latex of the rubber tree or others.



poliizopren

[poli(1,4-izopren)]

The final properties of a rubber depend on both on the polymer structure and also the types of modifiers and fillers.



Natural rubber is the substance obtained from latex, which is the extract of rubber tree named Hevea Brasiliensis.

This milky substance, which flows when the bark of the tree is slightly split, does not lose its softness.

The latex is a sticky, milky colloid drawn off by making incisions in the bark and collecting the fluid in vessels in a process called "tapping".

Natural rubber is an important because of its mechanical properties, and strategic raw material for the tire and electric industries. Quality and property of the natural rubber depend, in part, on the quantities of non-rubber elements in the latex (Yip, 1990; Haque et al., 1995; Le Roux et al., 2000). In addition, the technological properties of the natural rubber vary according to the time of shelf life, type of coagulation, time of year and clonal origin (Le Roux et al., 2000; Ferreira et al., 2002; Moreno et al., 2003).

Natural rubber has flexibility and strength, as well as impurities and vulnerability to environmental conditions and hydrocarbons. Compared to other rubbers, natural rubber is one of the most flexible types, and it’s resistant to water and certain chemicals.

It’s also resistant to cutting, tearing, wear, fatigue, and abrasion, with a working range between -58 to 212 degrees F. Additionally, it has a lot of tensile strength and adheres easily to other materials.

However, natural rubber isn’t as effective at resisting heat, light and ozone as other rubbers like neoprene. The material also varies with the tree it’s produced from, as well as containing natural impurities. While natural rubber is resistant to water and some chemicals, it’s still vulnerable to fuel, oil, and non-polar solvents.

Latex freezes immediately after the flows from the tree.

Natural rubber is used extensively in many applications and products, either alone or in combination with other materials.

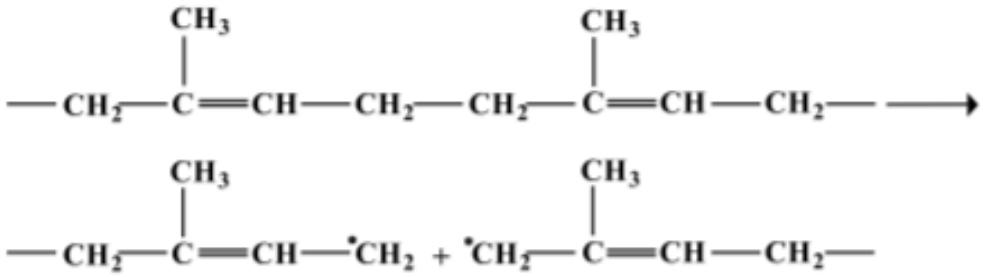
Ironically, production of rubber trees in its original source in South America is negligible, with present suppliers being Malaysia, Indonesia, Sri Lanka, Nigeria and others. Attempts have been made to extract NR from the dandelion and poinsettia plants and more seriously from a Mexican shrub called Guayule (Pertbeniurna rgentaturn), but without economic success.

Gutta-percha and balata are minor specialized sources. Production of the natural product begins at the plantation where a slit is made into the bark of the rubber tree to allow the flow of a milky sap. This latex consists of water, polyisoprene, and small quantities of other ingredients such as proteins and carbohydrates. It is collected and coagulated with formic acid

The coagulum is then squeezed between rollers, to remove excess water and dried. Much of it is then baled and shipped off to the rubber processor. Some areas of the rubber industry use the latex directly for such items as medical gloves and condoms. In this case the latex is concentrated, mixed with ammonia for mechanical stabilization at the plantation, and shipped out.

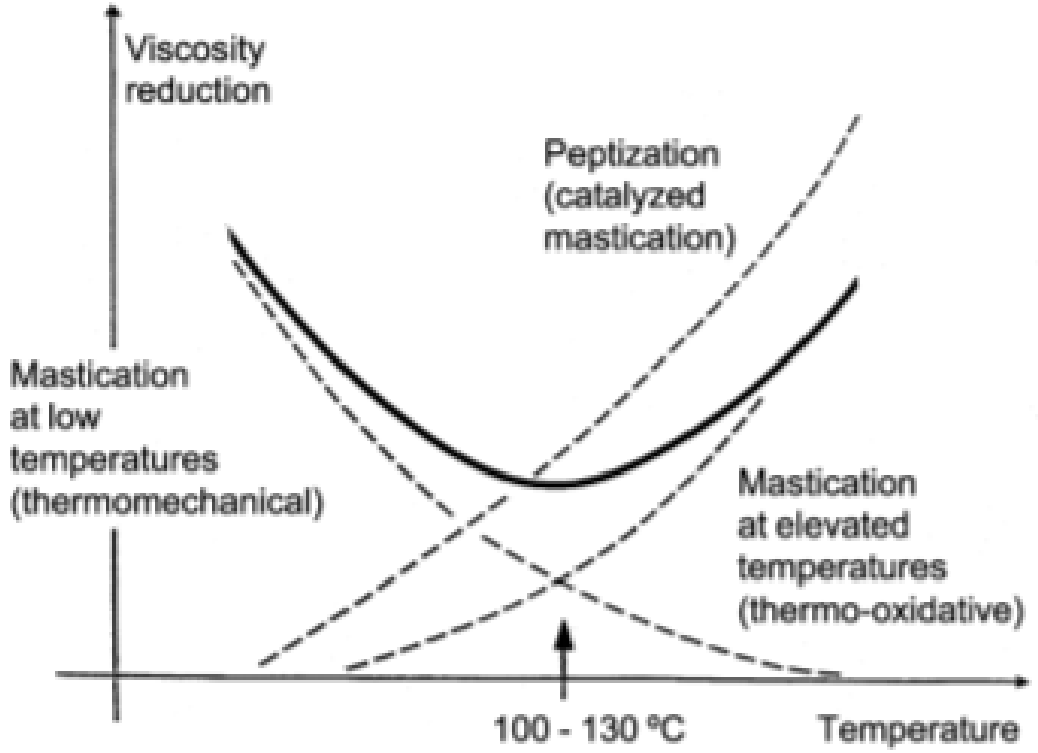
Although the natural rubber mastication process may be accomplished on an open mill, it is generally carried out in an internal mixer. During mechanical breakdown the long-chain rubber molecules are broken under the influence of high shear from the mixing equipment. Chain fragments with terminal free radicals are formed, which recombine to form long-chain molecules

Temperature is an important factor in the mastication of natural rubber



Physical peptization of polyisoprene

Free radicals are generated when the molecular chains of the rubber are broken by mechanical or thermo-oxidative means



Peptization of natural rubber. Viscosity reduction vs. temperature

These radicals may recombine, and consequently no reduction in molecular weight and viscosity will be observed. Moreover, branching is likely to occur. The peptizing agents can act as radical acceptors, thus preventing recombination of the generated chain-end free radicals.