

Degradation of rubber compounds under natural conditions

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Rubber compounds are complex, chemically active and viscoelastic materials. The resulting rubber compounds are made up of a mixture of elastomers and fillers such as carbon black, silica, kaolin, calcium carbonate and others. A very important element of which rubber compounds are composed is sulphur. Its important function is to ensure the cross-linking process during vulcanisation. Lubricants, plasticizers and various organic substances that are used to modify the properties are also essential components of rubber compounds.

Rubber recycling is the process of repurposing irreparably damaged or worn rubber products (natural or synthetic) for new uses in order to prevent rubber waste from ending up in landfills. The process of recycling and reusing rubber requires less energy (less stress on natural rubber, saving landfill space and reducing pollution) than making new rubber. Most of the rubber for the rubber recycling industry comes from waste tires. The rubber recycling industry converts waste rubber products into usable material that can be used to make new rubber products. Waste rubber can also be converted into fuel.

In the typical rubber recycling process, rubber is collected, shredded, sorted, and finally devulcanized to transform waste rubber into raw material. Devulcanization of rubber waste is a process that reverses the vulcanization of rubber, recycling it so that it can be vulcanized again. This process converts waste rubber into a new “virgin” raw material. The devulcanized rubber can be mixed with virgin rubber or with other kinds of matrices to give new compounds without generating a significant decrease in mechanical and physical properties. In addition, there are other options for processing waste rubber, such as freezing or pyrolysis of rubber waste.

This article deals with the possibilities of recycling rubber waste in natural conditions. The factors that influence the rate and extent of degradation of rubber compounds under natural conditions are temperature, humidity, pH, UV radiation, microorganisms. Test samples of rubber compounds were exposed to dry and moist soil for 1, 2 and 3 months. The samples were evaluated for the change in selected mechanical properties, weight change and surface degradation of the samples were observed by light microscopy. Based on the result, there is a slow degradation of the rubber compound under natural conditions in wet soil, which manifested by a change in the pH of the environment, a decrease in mechanical properties. Negative changes in the surface topography were observed on the light microscope. These changes were more pronounced with increasing exposure time of the samples.

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