



What is Nitrile?

Nitrile gloves are made from a synthetic polymer that exhibits rubber like characteristics when vulcanized. The polymer is made in the form of a latex or emulsion and can be used or processed very much like natural rubber latex. There are some differences which make this polymer unique. Unlike natural rubber which is polyisoprene, the backbone of the nitrile polymer is composed of three ingredients or monomers ("mono" meaning one and "mer" meaning unit), namely acrylonitrile, butadiene and a carboxylic acid. The term "terpolymer" is sometimes used to describe a combination of three different monomers. The word "polymer" implies by contrast, "many units" put together in unique ways to form a large molecule.

The properties of this polymer or large molecule are thus dependent on its composition and the way in which its individual units or monomers are joined together. Each monomer in this composition performs a unique role and contributes to the overall balance of properties. The term "nitrile" is used as a description for these polymers because many of the distinguishing features are due to one of the monomers used, namely acrylonitrile. The presence of this monomer imparts permeation resistance characteristics to a wide variety of solvents and chemicals. Due to the polar nature of acrylonitrile, these polymers are especially resistant to hydrocarbon oils, fats and solvents, unlike natural rubber which has very poor resistance to these chemicals.

The butadiene component in the polymer contributes toward the softness, flexibility and feel of the glove. It is also responsible for participating in the vulcanization process involving sulfur and accelerators, thereby enhancing the rubber-like or elastic quality of the glove.

The carboxylic acid component interacts with zinc oxide in the compound formulation and contributes toward increasing the tensile strength, abrasion, and tear resistance of the glove. This is achieved through the formation of ionic bonds/crosslinks between the carboxylic acid groups and zinc oxide. This also is responsible for enhancing the solvent resistance of nitrile gloves. This is absent in

natural rubber because it does not have any carboxyl functionality.

Thus by controlling the composition and the formulating ingredients such as zinc oxide, sulfur, and accelerators, the performance of the finished glove can be significantly altered. Features like softness, feel, modulus, solvent resistance, tensile and tear strength can be controlled much more easily than in natural rubber. What this means is that nitriles can be tailored to achieve a desired performance.

In addition, nitrile gloves can dissipate electrostatic charge much better than natural rubber and this can be a valuable feature in the semiconductor industry. Because of their good abrasion resistance they also generate significantly less particulate matter that can potentially act as contaminants during manufacturing.

Information Source:

Reichhold Chemicals, Inc.

Note: All standards referenced should be reviewed for the latest active revision level.