Influence of Crystallization and Filler Degrees on Viscoelastic Properties of Rubber Compounds

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Overview

The investigations cover the discussion of three topics: the die swell has been determined for all capillary experiments. The investigations were performed with various rubber compounds used in industry, with amorphous and crystalline structures. The investigations were submitted to further橡胶 compounds with different filler degrees. The investigations were performed with various rubber compounds used in industry, with amorphous and crystalline structures. The investigations were submitted to further rubber compounds with different filler degrees.

Die Swell - Swell Value Measuring Unit

For this investigation six rubber compounds were investigated, two different chemical conditions of EPDM, amorphous and crystalline, with three different filler degrees each (see Table). The parameter of a capillary experiment, length and diameter of the used capillary, the melt temperature, and the corresponding shear strain rate, have a certain influence on the die swell of non-Newtonian fluids. With an empirical relationship these influential factors are evaluated. The die swell phenomenon is investigated. The equation allows characterization of die swell by means of only one material parameter. Furthermore, the influence of variation of the crystallization and filler degree of the compounds on the die swell is covered by only one parameter. This parameter is always higher for rubber compounds consisting of polymers with crystalline structure. For different filler degrees, a decrease of the die swell with increasing filler content is detected.

Elastic Deformation - Material Parameter describing Die Swell

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Elastic Moduli - Torsional Rheometry

For the experimental investigation of rubber compounds by torsional rheometry, the simplified Huet model reproduces the viscoelastic behavior satisfactorily. Under consideration of two material parameters, a clear trend for both properties is detected. Using EPDM on the shear-thinning properties of the investigated rubber compounds. Using a double-logarithmic plot for the viscosity function, a clear trend for both properties is detected. Using EPDM on the shear-thinning properties of the investigated rubber compounds. Using a double-logarithmic plot for the viscosity function, a clear trend for both properties is detected.