



MANUFACTURE OF ACCELERATOR-FREE MEDICAL GLOVES VIA UV TECHNIQUES

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The photochemical pre-vulcanization of natural rubber (NR) latex via the thiol-ene reaction is a new approach aiming at the replacement of noxious processing agents used in conventional sulfur vulcanization processes (e.g. accelerators) together with cost saving options. The cross-linking reaction involves the excitation of a selected photoinitiator with ultra-violet (UV) light which is followed by the formation of thioether links due to the thiol-ene addition reaction. The photochemical process is carried out in a falling film photoreactor which provides not only a continuous pre-vulcanization process but exhibits a technology which is already commercially well established. The main advantage of the falling film process lies in the short pre-vulcanization time reaction and the mild reaction temperature. The medical gloves are then made from the UV pre-cured NR latex by a conventional coagulant dipping process. The UV cured gloves have good physical properties and ageing stabilities which clearly exceed the quality requirements according to the EN 455-2 (2000). In addition the skin compatibility of the new gloves was evaluated by skin sensitization, skin irritation studies and cytotoxicity tests. Furthermore, the biologically available chemical residues in the gloves were characterized by elementary analyses and HPLC-MS spectroscopy. The results of these studies reveal that photochemically cross-linked gloves exhibit good skin compatibility together with low cytotoxicity and residual chemical levels.