

Integration of Cure Kinetics and Mathematical Modeling for Rubber Curing Process Optimization

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The rubber industry produces a variety of products, including tires, gloves, footwear, and industrial components. Rubber curing is a complex process that involves heat, pressure, and time, transforming raw rubber into durable products. Optimizing this process requires accurate prediction of curing parameters, making mathematical simulations a valuable tool. This study aims to predict curing behavior qualitatively, estimating the rate and degree of cure over time at specific temperatures. A user-friendly software developed in this project generates curing parameters based on rheometer test data under isothermal conditions. This method eliminates the need for extensive laboratory work, providing an efficient way to determine optimal curing conditions. The software can also generate temperature profiles for specific points in rubber articles. Rheometer graphs from an RPA Flex machine provide the quantitative data for these simulations.

Keywords: *rubber curing, mathematical modeling*