

ANALYSIS OF STYRENE GRAFTED EPOXIDIZED NATURAL RUBBER (ENR50-PS) THROUGH GRADIENT HPLC TECHNIQUES

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ABSTRACT

In order to enhance the properties of polymers, it is necessary to have a clear understanding of the chemical microstructure of a polymeric material. Materials resulting from a grafting reaction have a very complex chemical microstructure due to the fact that grafting is random and emulsion polymerization is a heterogeneous process. Due to the grafting reaction between two polymers, it is therefore possible that grafted, as well as non-grafted material can be present at the end of the reaction. This, however, can be determined through the use of gradient HPLC techniques which is based on the difference in solubility of the polymers present after the reaction has taken place. Gradient HPLC allows separation through chemical composition as well as molar mass and the direction of separation is determined by chromatographic conditions e.g. solvent/non-solvent pairs, column, gradient etc.

This technique can then be generalized to function as an on-line technique to monitor grafting reactions, hence promoting the properties of the grafted material.

In this study, styrene was grafted onto epoxidized natural rubber (ENR50) through an emulsion reaction. The initiator and monomer concentrations were chosen to represent 5 distinct reaction conditions to be able to compare the analysis results.

The study concludes that separation between the graft copolymerization mixture i.e. the desired graft copolymer, non-grafted precursors and homopolymers, is possible (Fig. 1).

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