

Raman Spectroscopy Evaluation of Polyvinylchloride Structure

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Polyvinylchloride (PVC) is one of the most widely used commercial polymers, and the field of its application continues to expand rapidly. Effective development of state-of-art functional materials, such as PVC-based nanocomposites, copolymers, blends and fabrics, subjected to special kinds of treatment, requires elaboration of new, more informative approaches of PVC structure evaluation. Industrial PVC is characterized by variety of states of macromolecules and very low degree of crystallinity. Thus, the best way to evaluate PVC structure is to apply vibrational spectroscopy, the unique feature of which is high information capacity in the study of the different configurational and conformational states of macromolecules.

Most of the Raman spectroscopic methods of PVC structure testing were developed more than 20 years ago. Therefore, improvement of the already recognized methods and development of modern computer-based processing of the spectra for the detailed quantitative analysis of PVC structure are important. In this work, we present an extensive study of polarized Raman spectra of a number of industrial grades of PVC powder and films, prepared from solutions of tetrahydrofuran and acetophenone. For PVC itself and residues of the solvents, remained in the films, we determined the number of Raman lines and their spectral characteristics. These data were used to assign accurately PVC Raman lines and to evaluate structure of different grades of PVC powder and films.

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