

Review of the dissertation of MSc. Hamza Aboelanin "Synthesis and Characterization of Branched Polymers."

The dissertation thesis of MSc. Hamza Aboelanin is divided into two basic chapters, and both are concerned with the separation and detailed characterization of the molar mass, molar mass distribution, and molecular structure of branched polymers. The first chapter focuses on two types of methacrylate-branched polymers. The first type is star-branched methacrylate polymer which was prepared by group transfer polymerization in tetrahydrofuran (THF) as a solvent. The second type, linear methacrylate's short chain branching polymers, was prepared by solution-free radical polymerization in toluene as solvent. The molar mass and molar mass distributions, and branching studies for all the prepared methacrylate's branched polymers were determined by size exclusion chromatography with the most advanced detectors.

Chapter 2 described the monitoring of the chemical composition distribution of polyolefins. The monitoring of methyl and methylene groups of a series of ethylene/1-alkene and ethylene-propylene-diene copolymers was performed by high temperature-size exclusion chromatography with an infrared detector. The author investigated a series of polymer samples to correlate the ratio of methyl to methylene groups and the average chemical composition.

The results of the dissertation fully correspond to the set objectives. The evaluation of the thesis was facilitated by the fact that most of the results have already been published in highly reputable journals. This fact also documents the high scientific quality of the dissertation. It is evident from the thesis that the author has mastered not only the techniques of advanced polymer synthesis but also very advanced physicochemical characterization of polymeric materials by size exclusion chromatography complemented by advanced detection methods.

Comments

1. Scheme 2 - The graphic design of this image should be significantly improved. It's weirdly stretched.
2. Scheme 3 – The structure of PMMA is incorrectly drawn, there is one extra CH₂ group in the repeating monomer unit. And the brackets are supposed to be round, not square, according to the IUPAC polymer nomenclature rules.

3. There are only a few minor typos throughout the paper, such as in the list of figures on page VI - it should be Figure 29 instead of Figure 6. Or Fibre instead of fiber (p. 51). Elugram vs eluogram (p.72).

Questions

1. Why did you prefer Group transfer polymerization over other techniques?
2. Why did you characterize all your polymers just with SEC? Have you tried to characterize them also with AF4?
3. Can you comment on the upswing of the curve in conformation plots of your star-like polymers? I mean curves in Figures 10 – 12.

Conclusion

The above comments and observations in no way detract from the quality of the work presented. The author has clearly demonstrated the ability to creatively address a complex research task and critically evaluate the results obtained. In my opinion, the thesis definitely meets the requirements set for theses of similar types. It brings original scientific results, which have also already been published in four articles. Therefore, I fully recommend this dissertation to be accepted for defense.

In Prague, 22.11.2023

Ing. Libor Kostka, PhD.

