

Oligomeric composition of palm olein-based polyols: the effect of nucleophiles

ABSTRACT

Increasing environmental concerns have led to significant breakthroughs in developing vegetable oil-based polyols, including palm olein-based polyols (POoPs). The effect of nucleophiles (water, monol, linear, and branched diols) on oligomeric compositions and properties of polyols derived from epoxidized palm olein (EPOo) is investigated. Conversions of EPOo to POoPs are confirmed by FTIR analysis, oxirane oxygen content, and hydroxyl number measurements. GPC calibrated against polyether polyols is used to determine the formation of oligomers of the polyols. Functionalities of POoPs prepared with linear diols are higher than the branched diol determined using GPC and VPO. Lower degree of oligomerization is observed in polyols prepared with water and methanol compared to polyols made with diols. POoPs prepared using water, methanol and 1,2-propanediol (PG) produces 100% secondary hydroxyls polyols, while reaction with linear diols, polyols with mixture of primary and secondary hydroxyls in the range of 26–36% and 64–74%, respectively are produced. Viscosity and glass transition temperature of POoP PDO, prepared from 1,3-propanediol (PDO) are higher than POoP PG, prepared from PG, 7789 mPa.s and $-15.2\text{ }^{\circ}\text{C}$ compared to 3649 mPa.s and $-20.8\text{ }^{\circ}\text{C}$, respectively.

Keyword: Biobased polyols; Gel permeation chromatography; Nucleophiles; Oligomerization; Thermal properties