THE EFFECT OF MOLECULAR COMPOSITION ON THE MECHANICAL PROPERTIES OF LINEAR LOW DENSITY POLYETHYLENE SYNTHESIZED WITH 1 - HEXENE CO MONOMER UNDER DIFFERENT CATALYTICAL CONDITIONS.

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ABSTRACT

The MSc study focuses on the effect of the molecular composition on the mechanical properties of the linear low density polyethylene synthesized with the 1- hexene comonomer. Catalyst trials were conducted on the linear low density Sasol HFM2020 grade to evaluate alternate catalysts. Studies were conducted to investigate if the samples synthesized under the catalyst trial conditions showed any significant differences in terms of crystallinity and mechanical properties to the sample that was synthesized using the current catalyst.

The macro product properties namely bulk density, level of hexane extractables and particle size were different for the trial samples in comparison to the base case sample. The differences observed in the trial samples in comparison to the base case sample infer that the trial samples were synthesized with differences on a molecular level. These differences in the chemical composition between the base case sample and the comparative samples were fully explored using preparative Tref, Crystaf, DSC, ^{13}C NMR, HT GPC and free volume positron annihilation lifetime spectroscopy (PAL).