

# **A COMPARATIVE ANALYSIS OF THE CHEMICAL COMPOSITION OF LINEAR LOW DENSITY POLYETHYLENE POLYMERS SYNTHESIZED WITH 1- HEXENE COMONOMER UNDER DIFFERENT CATALYTICAL CONDITIONS**

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## **ABSTRACT**

A comparative study of the chemical composition of linear low density polyethylene polymers, synthesized with 1- hexene as comonomer was conducted. Catalyst trials were conducted on the linear low density 1- hexene Sasol polymer grade material to evaluate alternate catalysts. A comparative analysis was performed in order to investigate if the samples synthesized under catalyst trial conditions show any significant differences in terms of crystallinity and mechanical properties with the reference sample that was synthesized using the current catalyst.

The results showed that the macro product properties, namely bulk density, level of hexene extractables and particle size, are different for the trial samples in comparison with the reference sample. The differences observed implied that the trial samples are synthesized with differences on a molecular level. The differences in the chemical composition between the reference sample and the comparative samples are fully explored using a wide range of analytical techniques, namely crystallization analysis by fractionation (CRYSTAF), temperature rising elution fractionation (TREF), differential scanning calorimetry (DSC), Carbon 13 nuclear magnetic resonance (<sup>13</sup>C NMR), Gel permeation chromatography (GPC), Positron analysis lifetime spectroscopy (PALS) and micro hardness analysis.