TITLE	RHEOLOGICAL STUDY FOR PREDICTING MOLECULAR CHARACTERISTICS OF POLYETHYLENE MELTS.
AUTHOR	YODPRADTHANA SAMANA
DEGREE	MASTER OF SCIENCE PROGRAM IN POLYMER SCIENCE AND TECHNOLOGY
FACULTY	FACULTY OF SCIENCE

ABSTRACT Five commercial grades of high-density polyethylene (HDPE) with different melt flow rate (MFI) values from the manufacturer (IRPC Co., Ltd.) were investigated for their molecular characteristics including: molecular weight (MW), molecular weight distribution (MWD) and branching by rheological techniques under shear and elongational flows. This study aimed to implicate the optimal test conditions for classifying the molecular characteristics of given HDPE resins. In the first part, rheological properties of all samples were measured using capillary and parallel plate rheometers with various test conditions. Results obtained reveal the viscoelastic behaviour of HDPE was influenced remarkably by the molecular characteristics. Difference in molecular architectures of HDPE resins with similar MFI value could be well distinguished by the rheological properties at low-frequency region. Moreover, the relaxation test was found to be effective for identifying the HDPE possessing long-chain branching (LCB) as compared with the conventional capillary test. In the second part, the elongational flow was focused. Results exhibited that the melt spinning technique was significantly more efficient than the calculation of elongational viscosity based on the Cogswell equation for differentiating the molecular characteristics of HDPE resins having similar MFI value. The results measured from the melt-spinning technique under the elongational flow were in good agreement with those from the frequency sweep and relaxation tests under shear flow.