# SOLID SOLUTIONS OF LOW MOLECULAR WEIGHT OF POLY(ETHYLENE OXIDE) AND LITHIUM PERCHLORATE : CONDUCTIVITY, GLASS TRANSITION TEMPERATURE AND FTIR STUDIES

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## ABSTRACT

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Solution casting technique served to prepare solid solutions of low molecular weight of poly(ethylene oxide) (PEO) and lithium perchlorate ($LiClO_4$) with PEO having different molecular masses ($M_\eta$ = 6, 10, 20 kg $mol^{-1}$). Salt concentrations ($Y$) of the solutions were varied between around 0.02 and 0.20 ($Y$ = mass of $LiClO_4$/mass of PEO). Measurements of conductivity were carried out on these systems as a function of salt concentration at constant temperature (30 °C). It was observed that the conductivity decreases with ascending molecular mass of PEO. FTIR spectral studies suggest interaction of ether oxygen of PEO with $Li^+$ ion through the downshifting of $\nu$(C-O-C) and merging of the crystalline split of $\omega(CH_2)$. Glass transition temperature ($T_g$) increases with increase in salt content. Melting temperature ($T_m$) and melting enthalpy ($\Delta H_m$) decrease with increase in salt content due to decreasing amount of crystallizable materials available in the systems.

# CHAPTER 1

# INTRODUCTION

## 1.1 Background and problem statement

Polymers are macromolecules construct from many smaller structural units called monomers which are covalently bonded together in any conceivable pattern (Cowie & Valeria, 2008). During the past 40 years, the progress in polymer science has marked and practical impact on the human's life style due to the rapid increase in manufacturing of polymeric products after World War II (Harry et al., 1990). Examples of commercial polymers are poly(ethylene) (PE), poly(vinyl chloride) (PVC), poly(styrene) (PS) and etc.

Polymer can be classified into two major groups which are natural polymer and synthetic polymer. Natural polymer is the polymer that exists in nature. It can be divided into two origins which are biological origin and plant origin. Biological origin polymers are normally very complex like enzymes and proteins while the plant origin polymers are relatively simpler like starch, rubbers and cellulose. The synthetic polymers are the man-made polymers which can be classified as poly(ester), poly(carbonate), poly(urethane) and