THE CHARACTERIZATION OF INTERPENETRATING POLYMER NETWORK (IPN) BASED ON NR/PMMA

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ABSTRACT

THE CHARACTERIZATION OF INTERPENETRATING POLYMER NETWORK (IPN) BASED ON NR/PMMA

It is generally accepted that the effects of TMPTA crosslinker content are the key parameters in determining the characterization of IPN based on NR/PMMA compound. It is also defined that, the crosslinker also plays the most important component which influences the characterizations, thermal behavior and the degree of crosslinking of IPN. IPN of NR/PMMA was prepared by solution polymerization of MMA with the presence of NR solution and TMPTA as a crosslinker. Structural characterization of the NR/PMMA interpenetrating polymer network was investigated by Fourier Transform Infrared Spectroscopy (FTIR) whereby the strong peak at 809cm^{-1} and 1630 cm^{-1}based on TMPTA $C=CH_2$ structure is reduced in the IPN structure due to the increases of TMPTA content which have been expected to occurred due to the complete reaction of IPN. Differential Scanning Calorimetry (DSC) was used to study the Tg at which the Tg value is increased with the presence of TMPTA and Soxhlet Extraction Method was used to determined the degree of crosslinking of the IPN. The degree of crosslinking increased due to the increased in TMPTA content in the NR/PMMA compound.

CHAPTER 1

INTRODUCTION

1.1 Background

An Interpenetrating Polymer Network (IPN) is a combination of two polymers in network form which at least one is synthesized and/or cross-linked in the immediate presence of the other without any covalent bonds between them. These polymers are closely related to other multicomponent materials, containing completely entangled chains, such as polymer blends, grafts and blocks. However, IPNs are distinguishable from blends, block copolymers, and graft copolymers as IPN can swell in solvents without dissolving and can suppress creep and flow.

The compositions of the IPN could be varied by varying the reaction parameters such as swelling time and concentration of crosslinker. The tensile properties of the IPNs show that with increase in bulkiness of the ester group of the acrylate, the tensile strength decreases, whereas elongation at break increases because of the decreased stiffness of the acrylate phase (Deb, 1996).