# THE INVESTIGATION OF MECHANICAL PROPERTIES OF PVC/PEMA POLYMER BLENDS USING DYNAMIC MECHANICAL THERMAL ANALYSIS (DMTA)

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## ABSTRACT

## THE INVESTIGATION OF MECHANICAL PROPERTIES OF PVC/PEMA POLYMER BLENDS BY USING DYNAMIC MECHANICAL THERMAL ANALYSIS (DMTA)

This work presents the applications of Dynamic Mechanical Analyzer to characterize the properties of polymer blends, PVC/PEMA (poly ethyl methyl crylate / poly vinyl chloride). In this project, four sample that different in the compositions of PEMA was used. We maintained the amount of PVC but used different composition of PEMA that were 15%, 25%, 30% and 40%. All the composition of PEMA and PVC was prepared by solving cast technique and makes as four different thin film sample. Through the tension mode with a single frequency and temperature scan, the entire sample was characterized and resulted in storage modulus, loss modulus, tan delta and glass transition. The graph for all the result was obtained using OriginPro. The result showed that the pattern of the storage modulus, loss modulus and tan delta was same for each sample. Sample 25% of PVC/PEMA was showed the highest of storage modulus and also for loss modulus. While in tan delta, PVC/PEMA of 40% showed the highest result. We also know the glass transition temperature based on their peak value. Therefore, DMTA was a powerful and a sensitive tool that can measure all of the mechanical properties of polymer blends.

# CHAPTER 1

## 1.0 Introduction

A polymer is a large molecular composed by repeating structural unit. This sub-unit is connected by covalent bond and sometimes the term of polymers is referring to plastic. Polymer materials become widely essential in our daily life. It can be divided into some type or group of polymers that are natural polymeric materials and synthetic polymeric materials. Natural polymeric materials such as shellac, amber, and natural rubber have been used for centuries. A variety of other natural polymer exists such as cellulose which is the main constituent of wood and paper. Then, the list of synthetic polymer includes synthetic rubber, Bakelite, nylon, PVC, polypropylene, silicon and many more. Each type of polymer has own physical and chemical properties. The areas of the polymer study are polymer chemistry, polymer physics and polymer science. The field of polymer chemistry is frequently associated with materials science because polymers investigation output are often examined with a potential use in mind (Mariana Cristea *et al*,. 2008).

Nowadays, polymer researches and developments have been less centered on new polymer compositions but more on the modification of existing polymer structures. The modifications include composites, block copolymers, interpenetrating networks and polymer blends. The modification, compounding and polymer blending of conventional polymers have been generally regarded as the means of adjusting the properties or producing a desired property or "grading" of a basic polymeric material (Ahmed and Fahmy, 1999). Ahmed and Fahmy also mentioned that, in some polymer blends the effective property modification is dependent upon the miscibility or compatibility of the