CHAPTER I

INTRODUCTION

1.1 General

Poly(vinyl chloride) (PVC) has become increasingly popular for a wide range of applications such as cable covering, raincoats, fabric coating, etc., where flexibility, toughness and, in some cases, transparency were required, and that these articles could be made on equipment already available for processing rubber. The development of PVC's formulae is generally a popular method used in developing new materials with desired properties. Development is done for a variety of reasons including creating materials with enhanced properties. The products from PVC are rigid products such as fitting and pipe, flexible products such as blood bag, flexible pressure hose and tubing. The great majority of methods used in controlling the properties of PVC are adding plasticizer, filler, lubricant and pigment. The most important factor to obtain useful PVC resin is selecting the suitable PVC's molecular weight for some products. Generally, for rigid product, PVC resin that has K-value of 55-66 is used for flexible product, K-value of 66-72 is chosen.

The advantages of low molecular weight PVC or low K-value PVC are improving processibility and increasing melt flow ability which are required in rigid PVC injection molding.[1] Blending of low molecular weight PVC with high molecular weight PVC can be used in improving thermal stability and processability.[2] Molding for office machine housings and similar parts are

obtained from blending of low molecular weight PVC with acrylonitrile butadiene styrene (ABS) polymer.

Molecular weight of PVC depends upon the polymerization temperature. In the typical lower polymerization temperature, the higher molecular weight PVC is obtained. Simple method for synthesis of low molecular weight PVC is polymerizing PVC at high temperature. The disadvantages of this method are the production of densed morphology of PVC grains or decreasing of porosity of PVC grains,[3] more vinyl chloride monomer in PVC resin and ungel PVC particles (fish eye) on PVC product. Moreover, synthesis of PVC resin at high temperature requires high polymerization pressure. Additon of chain transfer agent during polymerization can reduce both polymerization temperature and polymerization pressure.

1.2 Objectives

The objectives of this research are :

1.2.1 Synthesis and characterization of low molecular weight PVC resin by using chain transfer agent.

1.2.2 Preparation of PVC dry blend from low molecular weight PVC resin and investigation of their machanical and thermal properties.

1.3 Scope of the Research

1.3.1 Synthesis of Low Molecular Weight PVC Resin.

The K-value was used as an index to classify the molecular weight of PVC, the required K-value is 50±1. The polymerization temperatures studied were 81, 77, 73 and 69 °C. As a reference, low molecular weight PVC

resin was synthesized at 81°C without chain transfer agent. In the other polymerization temperature, the amount of chain transfer agent was varied until the K-value of PVC was 50±1.

1.3.2 Characterization Low Molecular Weight PVC Resin.

The physical properties of PVC resin studied were mean particle size, distribution of particle size, bulk density, cold plasticizer absorption and fish eyes.

1.3.3 Investigation of the Properties of PVC Dry Blend in the Rigid PVC Application.

The properties investigated were static and dynamic heat stability, fusion, heat deflection temperature, izod impact strength and melt flow index.