A REVIEW ON THE APPLICATION OF NATURAL BASED PLASTICIZER FOR POLYVINYL CHLORIDE

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ABSTRACT

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Plasticizers are chemical additives added to polymers to obtain desired mechanical properties as well as their processability and ductility. These properties result from the bonding of plasticizer and polymer molecules under plasticization's theory. The most commonly used plasticizer is phthalate. However, due to its toxicity which often makes people anxious to use it, plasticization is prohibited. Another alternative is to use natural based materials as plasticizer to polyvinyl chloride (PVC). Natural based plasticizers offer the same properties and functions as other plasticizers, but they are naturally plant-derived and have low toxicity. Examples of natural based plasticizers that can be used are epoxidized soybean oil (ESBO), epoxidized linseed oil (ELO), epoxidized castor oil (ECO), epoxidized sunflower oil (ESO) and fatty acid esters. The most commonly used plasticizer for PVC is ESBO as it has good compatibility with PVC as well as its ability in increasing its flexibility.

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CHAPTER 1

INTRODUCTION

1.1 Background of study

PVC is a thermoplastic resin commonly used in various applications such as medical devices, toys, wire insulation, clothing, furniture, packaging, upholstery, building materials, and the automotive industry (Chiellini *et al*., 2013). However, virgin PVC has its weakness and must be mixed with other ingredients in order to expand its applications. Rahmah *et al*. (2017) mentions that PVC has low thermal stability, high melt viscosity and brittleness. To achieve good material quality and application, PVC is mixed with various additives such as stabilizer, filler, and plasticizer. Gurgel *et al.* (2011) defines plasticizer as a substance that has low molecular weight and non-volatile which mostly used in the polymer industries as additives to increase the compound's flexibility. The International Union of Pure and Applied Chemistry (IUPAC) defines a plasticizer as ''a substance or material that are incorporated into material that are usually a plastic or elastomer to increase its flexibility, processability and, distensibility''. Plasticizer is added to other material to make it soft and pliable by separating the polar chains hence increasing its flexibility and lowering the viscosity (Gilbert, 2017; Godwin, 2017). PVC made without a plasticizer is known as unplasticized polyvinyl chloride (UPVC), which is naturally strong and hard, and PVC blended with a plasticizer is called plasticized