CHAPTER I
INTRODUCTION

Masterbatch production is a production of a polymer pellet that has an expected property. In order to make an additives disperse uniformly in the product, we need to produce master batch first. One of the interesting properties that industries want their product has is antibacterial properties.Antibacterial master batch production rate is growing everyday due to the need to use a clean product manner of consumer. The application of antibacterial that are developed and are in current development are film for food packaging, an antibacterial fiber (Chou *et al.*, 2005), an antibacterial plastic bag or an antibacterial for very clean application (medical application for example) (Peter *et al*, 2009). So, it must be effective if we can produce a good antibacterial master batch for mixing in Thai industry.

In the research view, there are many additives that have been used to mix with polymer. For example, metal nanoparticle that has antimicrobial activity such as silver, copper and zinc nanoparticle, organic substances that can inhibit the bacterial growth such asAcetic acidBenzoic acid in PE-co-MA , and Benzoic anhydride LDPE (Quintavalla *et al.*, 2002) and modified inorganic material such as zeolite impregnated with antibacterial metal (Narin *et al.*, 2010).

Some polymer added with antibacterial still has a problem. For example, if the antibacterial agent is a metal nanoparticle, it will be costly due to the high cost of nanomaterial. It the antibacterial agent is an organic agent, it will cause a diffusion of the antibacterial agent out of the polymer and maybe cause damage to consumer health. So, in order to fix these problems, we can use a non-migratory material for example zeolite. There are many publications concerning using zeolite as an antibacterial agent carrier by impregnating with an antimicrobial active species. For example, zeolite impregnates silver ion and zinc ion for antibacterial activity as a filling material in dentistry. Zeolite loaded both Ag and Zn for coating on stainless steel (Haile *et al.*, 2008), they used Ag-zeolite as a bacterial caused corrosion in ceramic. Fox reported a production of NO-

loaded Zn^{2+}-exchange zeolite material for antibacterial and other clinical applications (Fox *et al.*, 2010). Azben and Semra reported that the selectivity of the exchanger level of Ag^{+} compared with Na^{+}, Zn^{2+} and Cu^{2+} in Na-clinoptilotite (one form of zeolite) is in the trend like $Ag^{+}>Na^{+}>Zn^{2+}>Cu^{2+}$.As we can see there is less in research concerning effect on antibacterial of Ag-Cu-zeolite (Azben *et al.*, 2003). So the purpose of this project is to impregnate the Ag-Cu at various ratios to study the antibacterial activity of the material. Furthermore, we aim to use the material with LDPE as a base polymer to produce antibacterial LDPE master batch as well.