CHAPTER 1

INTRODUCTION

Problem Statement

Plastics have become an integral part of everyday life, and have been used for a multitude of purposes. They are ordinarily light weight, durable, and easily molded into a variety of forms. However, they are distinct disadvantage in that plastics are usually not capable of self-decomposition. Thus, a tremendous problem exists with most plastics in their continual accumulation and contribution to the increasing waste problems faced in many countries. The problem of disposal of undecomposible plastics has arisen to a point of consideration concern. Polyethylene plastic is among the most dominant packaging materials in today's society. Similar to other packaging products, when products from PE reach the end of their useful life, most are discarded in open dumps, landfills, or as simple litter. These materials have the disadvantage of not being degradable.

In Thailand, waste disposal is not conducted under a separate collection system. The Bangkok Metropolitan Authority (BMA) disposes all kinds of waste, either in open dumps or by incineration. However, the BMA now faces problems of area limitation for open waste dumping and also a high cost of energy as well as inefficiency of the disposal processes.

New Trends to Solve The Environmental Problem

The ideal solution of "Plastics Degradability" has been introduced as a method to solve the disposal problem of plastics as well as other products used frequently. Degradable plastics are a new type of "environmentally-friendly" packaging material used to cease the pollution of natural environments, which is caused by uncontrolled solid waste disposal.

An attempt has been made to create degradable plastics by incorporating starch into polymers. As the organism consumes the starch, a glucose-based natural polymer, surrounding the plastic that will lose its structural integrity, enhance other degradation mechanisms and eventually decline in mechanical properties. However, as the amount of starch is increased, the degradability characteristics will increase, but tensile strength has a tendency to decrease. The use of starch for degradable packaging is an area of concentrate research and commercial production in numerous Western and Eastern countries. The major starch used in these countries is corn, which in some countries would be competitive for land area and consumption as feed and food. Corn could also be an expensive starch product in many Asian countries having waste disposable problems mentioned above.

Thailand is very rich in different starch sources, especially in cassava starch. Corn is a major crop grown in the country but its use as starch is still limited since a majority of corn is exported directly for animal feed. Cassava is also a major export item in the form of animal feed pellets although starch is also produced. Among other Southeast Asian countries, Indonesia also produces a large quantity of cassava starch. With the uncertainty of markets for animal feed from cassava, new product development from cassava is an area of research in many producing countries so that post harvest utilization of cassava would be versatile.

Little work has been done in Asian countries on the utilization of these cheap cassava starch materials for industrial purposes. It would be useful to make attempts to incorporate cassava starch into plastics with a two fold objectives, i.e. for new product development from different starch bases, as well as the production of degradable packaging material that is "environment friendly"

This study focuses on the capability of developing a type of degradable plastic of starch-polyethylene base, which may be used as a packaging material; and the degradation of cassava starch-polyethylene composite films containing metal prooxidants. The resistance of the plastic to microorganism and natural weathering test of the polyethylene with and without starch filler were

investigated. Mechanical properties and the molecular weights were examined based on that they are sensitive to changes during degradation. The measurements of Fourier-transform infrared (FTIR) provide the existence and content of the characteristics functional groups.