Chapter 1

Introduction

With the rising concern for environmental protection, biodegradable polymers and biopolymer blends have attracted considerable attention as green materials and biocompatible materials in pharmaceutical, medical and biomedical engineering applications, including drug delivery systems, artificial implants and functional materials in tissue engineering [1]. Recently, the development of biodegradable films based on biopolymers has attracted attention mainly due to their friendliness to the environment and their potential substitution for some petrochemicals in food packaging industry. The biodegradable films generally produced from renewable natural and abundant biopolymeric materials such as polysaccharides, proteins, lipids or the combination of these components. Some biodegradable films based on the blends of polysaccharides and proteins such as methylcellulose-wheat gluten [2], soluble starch-gelatin [3], hydroxypropyl starch-gelatin [4], soluble starch-caseinate [5], glucomannan-gelatin [6] or some films based on the mixtures of polysaccharides-polysaccharides such as starch-methylcellulose [7], pullulan-starch [8], chitosan-starch and chitosan-pullulan [9], carboxymethyl cellulose (CMC)-rice starch [10] were investigated. Depending on the interactions between components, these formulas can improve the mechanical properties (tensile strength, elongation) and gas/moisture barrier properties in some cases.

Biopolymer films can contain antioxidants, preservatives or other additives to improve foods' mechanical integrity, handling and quality, and to change surface gloss [11]. Antioxidants are widely used as food additive to improve oxidation stability of lipid and to prolong shelf-life, mainly for dried products and O_2-sensitive foods. Synthetic phenolic antioxidants (SPAs), such as butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA) and tertiary butylhydroquinone (TBHQ), are commonly used because of their chemical stability, low cost and availability. Currently, the most frequently used antioxidants in functional packaging are butylated hydroxyanisol (BHA) and butylated hydroxytoluene (BHT) [12]. Although these synthetic antioxidants can effectively be used in active packaging, there are significant concerns related to their toxicological aspects [13]. However, their safety has been questioned. Natural antioxidants (such as tocopherol, ascorbic acid and quercetin) are more interested to replace for synthetic antioxidants currently used [14]. Incorporation of antioxidants into packaging materials has also become very popular since oxidation is a major problem affecting the food quality [15]. Thus, extensive research has been conducted to adopt some natural antioxidants such as phenolic compounds, vitamins E and C in place of synthetic antioxidants used in functional packaging [13, 16]. Some natural antioxidant incorperated films have also been developed from biopolymer [17-24]. Similar to biopreservatives and edible packaging materials, the natural antioxidants are also readily accepted by the consumers and they are not considered as chemicals [25].

Objectives

1. To study the formation and formulas of cassava starch based films.

2. To determine and characterize the properties of cassava starch blended film.
3. To study the addition of commercial and natural antioxidants in the blended films.
4. To investigate the effects of antioxidants on the cassava starch based films properties and their antioxidative activity.
5. To study the applications of antioxidant films in food.

Usefulness of the Research (theorical and/or applied)

1. Cassava starch based films can be improved its properties by blending with the other biopolymers.
2. Cassava starch based films containing antioxidants can be used for retarding the oxidative deterioration of foods.

Research Location

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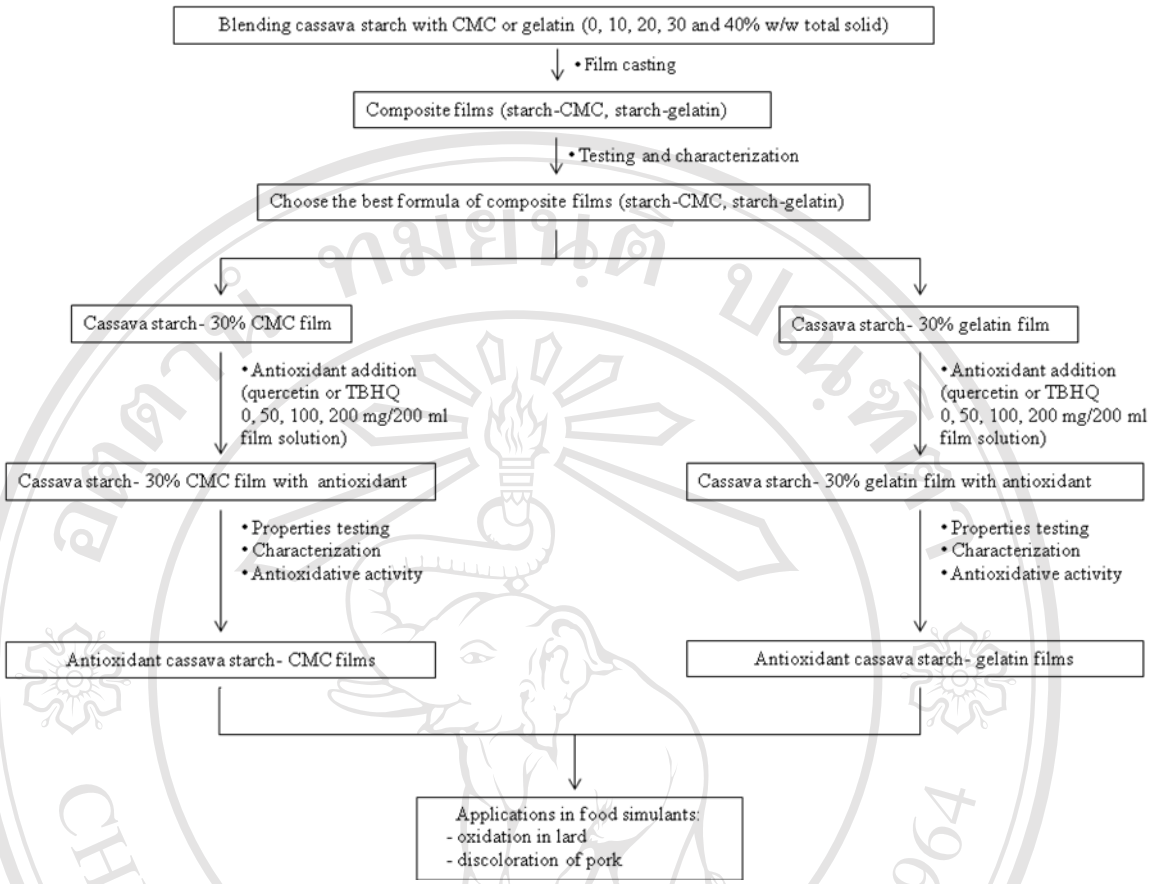

Figure 1.1 Scheme of experimental design**.**

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