

CHAPTER I

INTRODUCTION

Polysaccharides, well-known as the most abundant natural biopolymers in the world, were produced for more than 150,000 M tons per year (Navard, 2005). As a common knowledge, polysaccharides are naturally diffused and can be found in plants, animals and microorganisms, generating different fundamental biological functions. Considering on their functional properties, polysaccharides can be distinguished in potent energy from environmental substances.

Polysaccharides are commonly used in various food processing, including the sources of food nutrients, food additives, and source of biologically active molecules (Persin et al., 2010). Polysaccharides are also found as a main resources to produce commercial fructose through the enzymatic reaction using aldose isomerase (Henry et al., 1991). Fructose are now used extensively by manufacturers to sweeten foods and beverages instead of sucrose (Granstrom et al. 2004). Fructose as dominant sugar component in the recent food product may generate various products by glycation between fructose and protein through heating process causing positive and negative impact to the food processing and human health. Using extremely high temperature of heating process may cause the MRPs accumulation, and consequently forms the mutagenic compound that harmful to the body. It is known that MRPs provides impact to the complicated disease such as Diabetes mellitus, cardiovascular, renal, and kidney failure (Zhang

et al., 2009). In addition, Maillard reaction also has a positive value, especially in the food processing to produce the remarkable color development.

Maillard reaction is an advanced glycation process from non-enzymatic browning reaction between carbonyl compound of reducing sugar and amino groups with heating treatment. This reaction occurs in almost food processing such as milling, roasting, frying, and baking (Bastos et al., 2012). Maillard reaction plays an important role in improving appearance and taste of foods. During the process, the Maillard reaction is responsible for the formation of aroma, flavor, color, also improving the formation of antioxidant through the generation of MRPs. Furthermore, MRPs production was influenced by factors such as reducing sugar, amino groups, heating treatment and pH.

Lysine is the most reactive amino acid and having brownest color among other the most commercial amino acids. It has been understood that lysine occurred in the abundant food resources. ϵ -amino group of lysine availability for Maillard reaction by attracted reducing sugar to form glycation reaction (Gu et al., 2009). This group also generate the brownest color of MRPs. Moreover lysine also have α -amino groups that reactive to form aldehyde compound. Reducing sugar that be use in this research is Fructose. Reducing sugar is a material influence on the occurrence of the Maillard reaction, C-chain on reducing sugar very important for MRPs formation (Bastos et al., 2012). Reactive side of lysine and fructose will generate the great intermediate compound such as browning intensity, browning index, and antioxidant that contain flavor and aroma of Maillard reaction.

MRPs generated from Maillard process can be assessed from browning intensity or fluorescent compound, browning index and antioxidant compound. Browning intensity is an indicator of Maillard reaction and precursor for brown pigment. Browning intensity monitoring by spectrophotometer with absorbance 420 nm. Generally, the browning index forming influenced by activity of browning intensity. In previous research from Alvarenga et al. (2014), reported that browning intensity had the positive correlation with antioxidant activity. Since the further Maillard reaction may cause the negative impact for health, this research is objected to demonstrate the Maillard reaction generated from Fructose and Lysine at low temperature of reaction, i.e. 50°C.

In this research using low temperatures to avoid the formation of carcinogenic compounds that can be formed due to too high temperatures. According to previous research (Labuza et al., 1998 ; O'brien et al., 1998 ; Surh and Tannenbaum., 1994) which many state that mutagenic compound was found in highly brown food, because the product has been through acrylamide processed by high temperature. The final product from this research is a support material such as powder which can be used to reduce off odor or off flavor on a food. This research is aimed to investigate the browning intensity, color development, spectra measurement, ABTS radical scavenging activity, and the correlation between browning intensity and scavenging activity of MRPs produced by heating process.