Research Assessment #2

Date: September 11th, 2020

Subject: Effect of Metal Ions on Antioxidant Activity of an L-Ascorbic Acid–Glycine Model System

Source:

Lei, Fuhou, and Yanxuan Wen. Advances in Chemical Engineering: ICCMME 2011. Trans Tech Publications Ltd, 2012. EBSCOhost, search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=517124&site=ehost-live.

Assessment:

Narrowing in on the chemical engineering field, I have been able to research a study on the common process known as the browning of foods and its effects on nutrition. This process was initially coined by the French physician, Louis Camille Maillard. This reaction occurs when amino acids and reduced sugars are in the presence of heat. It can be observed commonly in bananas, steaks, and bread. This reaction is very significant in that the browning process can lead to a decrease in the nutritional value of food and can lead to the formation of carcinogens.

The presence of metal ions may promote or reduce the antioxidizing process that takes place with the browning effect. In this study, copper and iron ions were tested to see their effect. The results of the study indicated that the metal ions had a significant effect in that they promoted the Maillard reaction. This is significant because the Maillard reaction is a common reaction in many household foods that can have adverse effects. The incorporation of metal ions in certain foods can be problematic, decreasing the amino acid concentration. For

genetically modified foods such as certain fruits, it may be ideal to decrease the saturation of metal ions in order to allow the foods to sustain nutritional value.

Through observing the L-ascorbic acid glycine mixture that simulates foods that undergo browning, it can be concluded that through the addition of metal ions, antioxidation activity increases. The oxidation of foods may lead to the production of free radicals that harm cells. Therefore, the addition of metal ions benefits foods that have a tendency to oxidate.

While the browning process has adverse effects overall, it can be asserted that it should be promoted as the foods that produce carcinogens also experience a decrease in free radicals. The decrease in free radicals is important in that it leads to a decrease in cell damage. The browning process can inhibit oxidation in foods which is a common issue in modern food storage.

In food processing, the browning effect is not ideal as it decreases the nutritional value of the food, however, it increases the safety of the food through decreasing free radicals. Ideally, the browning process would be decreased, while the antioxidation process would be increased. The addition of metal ions, copper and iron, have been observed to promote this effect.

Why is this study significant to our daily lives? Every day, large companies mass-produce and store foods that undergo oxidation. In order for these industries to increase the value the consumers gain from these foods, while also preserving them, they must find a way to prevent oxidation as well as the browning effect. Metal ions complete this task through their special ability to decrease pH levels in foods. While this study was performed in a simulated environment, it yields significant information to the food industry. Substances that decrease the pH level of foods can prompt increased preservation of food while also allowing them to retain

nutritional value. This outcome would provide the population with increased nutrition from longer-lasting food, while also benefiting companies through increasing the value of foods that undergo the browning process.

Overall, the study was able to determine a new stimulus that can have potentially positive effects on the food industry and the preservation of foods as a whole. The model system used to simulate real foods is very complicated and requires further research, however, this is a significant step in the development of longer-lasting foods.