A response surface methodology study on the effects of some phenolics and storage

period length on vegetable oil quality: change in oxidation stability parameters

Introduction

Edible oils are crucial for the human diet due to their high energy value, essential fatty acid content, ability to provide

good solubility for some vitamins, and cholesterol-lowering effect.

The preservation of vegetable oils is very difficult because of their high unsaturated fatty acid content. The

reaction between oxygen and unsaturated fatty acids causes the deterioration of lipids or lipid-containing

products. The possibility of inhibiting this reaction has been a source of interest because lipid

deterioration affects consumer acceptance and adversely influences other food components such as proteins,

carbohydrates, pigments, and fat-soluble vitamins, and results in development of an off-flavor, loss of nutritional

value, discoloration, and the formation of toxic compounds. These compounds formed during

oxidation can cause health problems, such as heart failure, cataract, and brain dysfunction, by cytotoxic action.

Moreover, it has been claimed that free radicals formed as a result of lipid

oxidation may lead to cancer development. The harmful effects of the oxidation depend on

the lipid composition (fatty acid profile; number; position, geometry, and conjugation of double bonds; antioxidants)

and environmental conditions during processing and storage such as oxygen, light, heat, and moisture.

There are many hazardous effects of lipid oxidation.

The addition of antioxidants into food formulations is the most general, easy, and accepted method to prevent

or retard lipid oxidation. Butylated hydroxytoluene, butylated hydroxyanisole (BHA), tertiary

butyl hydroquinone (TBHQ), and propyl gallate are synthetic antioxidants that are very commonly used in

the food industry. However, recent studies have reported that these synthetic antioxidants may have toxic effects

for health. For that reason, the use of TBHQ in food formulations is prohibited in Japan,

Canada, and Europe. BHA has been removed from the list of “generally recognized as safe”

(GRAS) compounds. In light of safety concerns about synthetic antioxidants,

researchers recently have focused on exploring natural antioxidant compounds, which are safer and more

effective than synthetic antioxidants. Of these natural antioxidant compounds, phenolic compounds have

mostly been used. Phenolic compounds are known as secondary metabolites of the plants. One of the most

important biological activities of these compounds is their antioxidant activity. There are

many studies in the literature dealing with the antioxidant capacity of different phenolics.

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