

Glycidol Ester (GE) - 3-MCPD Risk in Food and Mitigation Methods

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Recently, food contaminants in terms of food safety have been an important topic of research for consumers and producers. The recent studies on food contaminants are becoming of more vital importance in terms of food safety and public health. In recent years, glycidol esters and 3-monochloropropane 1,2-diol (3-MCPD) have become a common area of research and their structure, formation, factors affecting their presence in foods, analysis methods, toxicology, health effects and risk factors have begun to be examined extensively. Glycidol esters (GE) and 3-monochloropropane 1,2-diol (3-MCPD) are known to be process contaminants. 3-MCPD food contaminant was initially identified as toxic component that was formed as a result of a reaction of phospholipids, acylglycerols, and glycerol with hydrochloric acid in hydrolyzed vegetable proteins (HVP) in a study carried out by Velisek et al. (1978). When the international literature is analysed, the studies have revealed that 3-MCPD and glycidol esters are found primarily in processed foods such as acid hydrolysed vegetable protein and soy sauce, refined vegetable oils and fats, smoked foods such as meat and fish, potato products, chips and snacks, baby food, malt, cereals, fruits and vegetables, soups, biscuits and bakery products, milk and dairy products, and alcoholic beverages. Studies conducted at national level on 3-MCPD and GE in products put on sale in Turkey have been insufficient in terms of food safety and process safety. In one of the current studies, Özdikicierler and Yemiřciođlu (2016) have found the effect of deodorization conditions in the formation of 3-MCPD and GE with the response surface methodology. In another study, Önal and Yemiřciođlu (2016) discussed 3-MCPD and GE formation process in potato chips via a model system. In studies conducted, it has been reported that 3-MCPD is formed in processed foods as a result of primary reactions in the formation of lipid and chloride. This reaction comes out when the foods that have high oil and salt contents are processed at high heat treatment conditions (Karabulut and Yemiřciođlu, 2013; Chung et al., 2013). In 1996, the UK Food Committee stated that 3-MCPD levels in food and food products should be brought to minimum levels. Additionally, the UK Food Committee has made suggestions for improving the production conditions with regard to reducing food product levels. As a result of the studies carried out on the subject, in 2000 the UK Food Committee reported it as a carcinogen and a food borne contaminant with a potential genotoxic effect. Due to the potential genotoxic and carcinogenic effects of 3-MCPD, many studies have indicated the necessity of setting limits for the 3-MCPD substance in the relevant food products. Recent studies have emphasized that the main factor in the formation of 3-MCPD is the effect of process conditions (temperature and time) as well as the presence of Cl⁻ ion, monoglyceride and diglycerides (Karabulut and Yemiřciođlu, 2012). Most of the studies that have been carried out until now indicate the fact that 3-MCPD and GE are formed when the vegetable oils are exposed to high temperature applications, especially when the deodorization process reaches up to 230 °C depending on the type of oil being processed and chlorine ion is present in the environment. This study focuses on food safety risk and the elimination methods of this risk in products that contain refined oil and are subjected to heating by the addition of salt. The notice will also discuss the points to be considered in refining palm oil and its fractions, the risks in other refined vegetable oils and the situation in food products such as potato chips, snacks, and bakery

products.

Keywords: Food Safety, 3-MCPD, Glycidol ester