UNIVERSITI TEKNOLOGI MARA

CHLORINE ANALYSIS ON PALM OLEIN

MOHAMAD IMAN BENJI BIN JASNI
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Faculty of Chemical Engineering

ABSTRACT

In In palm oil industry, during the deodorization stage of the edible oils, chlorine ion is said to be formed as high temperature of the treatment caused the ion to bond to the hydrocarbon chain of the lipid molecule in oil. The chloride formation is categorized as contaminants by the European Food Safety Authority (EPSA) which they focused on 3-monochloropropane-1,2-diol (3-MCPD) compound. In certain studies, the formation of chloride ion could cause a harmful effect towards health. Thus, this research focuses to determine the total chlorine content in palm oil. For this research, palm olein is chosen as sample and it was analyzed through few methods to determine its total chlorine content. The methods are classified into two types and each analysis involves two kinds of testing methods. The results obtained in the wet chemical analysis is interpreted in standard deviation and average value that was obtained. Among the samples prepared, it can be observed that wet chemical analysis shows consistency results of chlorine content compared to instrumental chemical analysis.

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CHAPTER 1. INTRODUCTION

1.1 BACKGROUND OF STUDY

In the last 50 years, palm oil production has developed radically all throughout the world. It is one of the largest contributor in oil and fat production as the production of palm oil is more than 30%. Generally, 70% of the world palm oil production is on food and cosmetics industries followed by the biofuel production (Jena, 2017). Palm oil is commonly used in edible products such as margarine, cooking oil and also it is used in cosmetics and many more. In early 1870's British introduced the oil palm tree in Malaysia but it was just as an ornamental plant (Moralex, 2010).

Tennamaran Estate that is located in Selangor was the first place to commercial the oil palm tree in the year of 1917. The planting activities will then later establish the foundations for the current immense oil palm plantation and the oil palm ventures in Malaysia. The development of oil palm expanded at a quick pace in middle of 1960's, under the administration of agriculture diversification programme which was acquainted to lessen the nation's financial reliance on rubber and tin (Moralex, 2010). This plantation were largely based on the estate management system and smallholder scheme. In 2009, palm oil industries in Malaysia was one of the largest producers and exporters of palm oil in the world because 4.69 million hectares of land in Malaysia are under oil palm development and hence produced 25.48 million tonnes of crude palm oilwhich accounts for 11% of the world's oils and fats production and 27% of export trade of oils and fats (Pogaku & Hj. Sarbatly, 2013).

There are two types of oils produced from oil palm. They are crude palm kernel oil (CPKO) from the kernels and crude palm oil (CPO) from fibrous mesocarp. Both of the oils originate from the same fruit but their chemical and nutrition properties is different. Palm oil is very rich in carotenoids and vitamin E which gives best medicine towards oxidative deterioration. CPO is in orange red colour as it has high content of natural carotenes whereas CPKO is in white colour as it has low content of carotenes. Palm oil contains 45% palmitic acid, 40% oleic acid, 10% linoleic acid and 5% stearic acid which shows that, palm oil has a balanced ratio of saturated and unsaturated fatty acids and it is suitable to be use in various of food applications (Cottrell, 1991).

During refining of the edible oils, chloride ions formed during the deodorization of the oil. This chloride formation is categorized as contaminants by the European Food Safety Authority (EFSA) which focused on 3-monochloropropane-1,2-diol (3-MCPD) as this compound is a possible human carcinogen. Organic chlorides are compounds which contain a carbon-chlorine bond, including chloroform and chlorobenzene (Considine & Considine, 1995). Abundancy of chlorine content in palm oil happened during the plantation when certain pesticides and fertilizers which contain high amount of chlorine were used and hence the oil palm tree consumed the organic content from the fertilizers.

1.2 PROBLEM STATEMENT

Since oil palm is an edible oil, it is categorized as a food ingredient and palm oil is subject to strict quality and food safety controls. In certain countries, the production of palm oil is restricted to certain amount of chloride ion content or the production is prohibited to commercialize its product. A study was done on effects of chlorine ion in palm oil, this chlorine is harmful to human health and also considered as carcinogenic by the European food safety authority and few others association related to food safety and health (Considine & Considine, 1995). Also it was proven on the study on animal experiment on toxicity of chlorine to animals (Xiao, Zhou Y, Luo R.C, & Zhang Z, 2003). It is very crucial to analyze the chlorine content as it could help the manufacturer to reduce the chlorines in oil palm. Chlorine content in the oil palm will involve soluble chlorines and insoluble chlorine ions to be detected and hence several suitable methods needed to be identify in order to determine the total chlorine content in palm oil and comparing them in order to find a suitable method for this study.

1.3 OBJECTIVES

The objectives of this research are:

- To determine the total chlorine content in palm oil
- To compare different testing methods in order to determine the total chlorine content

1.4 SCOPE OF RESEARCH

The scope of this research is to compare different testing methods to identify the total chlorine content in the palm oil. Other than that, the testing methods covers the involvement of wet chemical analysis and also instrumental chemical analysis.