Short Papers

Influence of Atmospheric Oxygen and Freshness on the Oxidation of Fish Lipids during Their Extraction

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Although fish lipids are extracted with Folch,¹⁾ Bloor,²⁾ Autilis and Norton,³⁾ and Bligh and Dyer's⁴⁾ methods, the effects of oxygen in the air and freshness of fish on the oxidation of lipids during their extraction have been rarely considered on using these methods. Therefore, this study was designed to examine the influence of atmospheric oxygen and fish freshness on the oxidation of lipids during the extraction.

Lipids of bluefin tuna *Thunnus thynnus orientalis* for "Sashimi" with different freshness were extracted by the mixture of chloroform and methanol (2: 1, v/v) with the following procedure either in the air or in nitrogen gas; homogenization, filtration, washing and concentration.

It was recognized that lipids of bluefin tuna became liable to the oxidation by the atmospheric oxygen during the extraction as its freshness lowered (Fig. 1). Fatty acids C_{18:2} and C_{18:3} were hardly detected. The degree of oxidation of fatty acids with carbon number 20 in lipids extracted both in the air and nitrogen gas were not compared each other, because those fatty acids scarcely existed. It is not apparent why lipids of very fresh bluefin tuna were hardly oxidized during their extraction. At a very fresh stage, the antioxidative activity of fish tissues may be still effective or autooxidation of lipids may not be yet initiated.

In any event, all the extraction processes of fish lipids should be carried out under an inert gas when fish were stored after the catch. Otherwise, large errors in the fatty acid composition of fish lipids will be encountered.

Fig. 1. Influence of fish freshness and atmospheric oxygen on the oxidation of lipids during the extraction.

□: N₂, ▨: air

Lipids extracted from bluefin tuna muscles of differing freshness were methylated and the fatty acid compositions were examined by GLC. Freshness (abscissa) are given by the following formula:^{5,6)}

$$K_1 = (HxR + Hx) / (IMP + HxR + Hx) \times 100^{*2}$$

The vertical line indicates the proportion (%) of C_{18:1}/C_{18:0}, C_{20:5}/C_{18:0} and C_{22:6}/C_{18:0} of lipids extracted in the air against those in nitrogen gas, respectively.

References

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*² Hx: hypoxanthine, HxR: inosine, IMP: inosine-5'-monophosphate.