

Thesis Title	Identification of Fatty Acid Methyl Ester in Multistep Temperature-Programmed Gas Chromatography without a Reference
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Abstract

Gas chromatographic identification of fatty acid methyl ester (FAMEs) using equivalent chain length (ECL) has been widely accepted as a general identification system. With the recent advent in capillary column, more and more complex mixtures of volatile compounds have preferably been analyzed with temperature programmed gas chromatography (TPGC).

In this study, the equation proposed by Kittiratanapaiboon et al. (J. Chromatogr. Sci. 1998, 36: 541) (Eq. 1) is utilized to calculate the ECL from temperature programmed retention time with the aid of a personal computer.

$$t_r = \sum_{i=1}^m \frac{t_0}{m} \left[1 + e^{\left(\frac{c+dn}{\theta(t_{(i-1)})} + (a+bn) \right)} \right] \quad (\text{Eq. 1})$$

where t_0 is the dead time, t_r is the retention time of sample, n is the carbon number or ECL and $\theta(t_{(i-1)})$ is the oven temperature when the solute enter the i^{th} element at time $t_{(i-1)}$, a, b, c and d are thermodynamically column constants parameters. Both saturated and unsaturated FAMEs from Chinese mustard seed oil are successfully identified. The calculated ECL of both saturated and unsaturated FAMEs on SA Wax column at different temperature programmed modes (single, two, three and four step) are agree well with those reported in literature. The highest difference between the calculated ECL and those reported in literature is $\pm 0.45\%$.

Keywords: Carbon number / Equivalent chain length / Fatty acid methyl ester / Retention time / Temperature programmed gas chromatography