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The use of spectroscopic methods in combination with multivariate data analysis for determination of omega fatty acids: A review
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Abstract
Omega-3 fatty acids (ω-3 FAs), typically found in fish oils and marine-based products, are important fatty acids due to their beneficial activities toward human health, such as anti- inflammation, immune-stimulant, lowering the risk of cardiovascular disease and reducing blood pressure. Therefore, the determination of ω-3 FAs for quality control of products containing these FAs is very important. Molecular spectroscopic methods offered simple, fast, and reliable analytical methods for quality controls of food and pharmaceutical products containing ω-3 FAs since a large amount of information could be retrieved from molecular spectra. This review highlighted the employment of molecular spectroscopy such as near-infrared (NIR), Fourier transform infrared (FTIR), Raman, and nuclear magnetic resonance (NMR) spectrometer combined with multivariate data analysis or chemometrics for analysis of ω-3 FAs in fish oil-based products. From this review, it is reported that the combination of molecular spectroscopy and chemometrics could be used as effective analytical techniques for the analysis of ω-3 FAs, especially eicosapentaenoic acid (C20:5, ω-3) and docosahexaenoic acid (C22:6, ω-3), with high accuracy and high precision. The results of quantitative analysis of ω-3 FAs from NIR, FTIR, Raman, and NMR were comparable to those reference results obtained from gas chromatography-mass spectrometry measurement. In the future, collaborative studies through proficiency testing should be performed to get standardized methods based on molecular spectroscopy and chemometrics.

Author Keywords
chemometrics; DHA; EPA; Molecular spectroscopy; omega fatty acids

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