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The Comparison and Optimization of the Analytic Method for Canthaxanthin, Food Colorants

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Abstract : Canthaxanthin is keto-carotenoid produced from beta-carotene and it has been approved to be used in many countries as a food coloring agent. Canthaxanthin has been analyzed using High Performance Liquid Chromatography (HPLC) system with various ways of pretreatment methods. Four official methods for verification of canthaxanthin at FSA (UK), AOAC (US), EFSA (EU) and MHLW (Japan) were compared to improve its analytical and the pretreatment method. The Linearity, the limit of detection (LOD), the limit of quantification (LOQ), the accuracy, the precision and the recovery ratio were determined from each method with modification in pretreatment method. All HPLC methods exhibited correlation coefficients of calibration curves for canthaxanthin as 0.9999. The analysis methods from FSA, AOAC, and MLHW showed the LOD of 0.395 ppm, 0.105 ppm, and 0.084 ppm, and the LOQ of 1.196 ppm, 0.318 ppm, 0.254 ppm, respectively. Among tested methods, HPLC method of MHLW with modification in pretreatments was finally selected for the analysis of canthaxanthin in lab, because it exhibited the resolution factor of 4.0 and the selectivity of 1.30. This analysis method showed a correlation coefficients value of 0.9999 and the lowest LOD and LOQ. Furthermore, the precision ratio was lower than 1 and the accuracy was almost 100%. The method presented the recovery ratio of 90-110% with modification in pretreatment method. The cross-validation of coefficient variation was 5 or less among tested three institutions in Korea.

Keywords : analytic method, canthaxanthin, food colorants, pretreatment method
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