

Practical, Reliable and Inexpensive Assay of Lycopene in Tomato Products Based on the Combined Use of Light Emitting Diode (LED) and the Optothermal Window

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Abstract

Light emitting diode (LED) combined with the concept of optothermal window (OW) is proposed as a new approach (LED-OW) to detect lycopene in a wide range of tomato-based products (tomato juice, tomato ketchup, tomato passata and tomato puree). Phytonutrient lycopene is a dominant antioxidant in these products while beta-carotene is present in significantly lower quantities. Therefore for all practical reasons the interfering effect of beta-carotene at 502 nm analytical wavelength can be neglected. The LED-OW method is low-cost and simple, yet accurate and precise. The major attributes of the new method are its rapid speed of response and the fact that no preparation whatsoever of the sample is needed before the analysis. The lycopene found in tomato products studied here varies from 8 mg/100 g to 60 mg/100 g fresh product. Results obtained by LED-OW method were compared to the outcome of conventional, time consuming spectrophotometric methods and the correlation was very good ($R \geq 0.98$). Precision of the LED-OW instrumental setup ranged from 0.5 to 7.4%; the RSD achieved for lycopene-richest samples (≥ 40 mg/100 g) did not exceed 1.7%. Repeatability of analysis by LED-OW was found to vary between 0.7 and 7.1%.

Keywords: Lycopene, LED, optothermal window, tomato products