Title Fast determination of carotenoids in tomatoes and tomato products by Raman spectroscopy

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Abstract

Tomatoes and various products derived from thermally processed tomatoes are major sources of lycopene, a polyenic chromophore with 11-conjugated double bonds in the molecule. Apart from this micronutrient also other carotenoids such as β-carotene are present in the fruit. A new FT-Raman spectroscopy method suitable for direct, accurate and highly reproducible, quantitative measurements of lycopene and β-carotene in tomatoes and tomato products has been developed. Raman spectra obtained from various tomato samples present predominantly strong C=C and C-C stretching vibrations at 1510 cm^{-1} and 1156 cm^{-1}, respectively, which can be used as key bands for reliable identification and quantification of lycopene. The other major carotenoid occurring in tomato products, β–carotene, can be recognised in the obtained spectra as a shoulder at 1520 cm^{-1}. Based on the obtained calibration equations the changes in contents of both carotenoids can be analyzed simultaneously during processing of tomato juice, tomato purée and tomato ketchup.