Raman spectroscopy as a tool for evaluating the ripening index of Parmesan and Minas standard cheeses.

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Parmesan (PAR) and Minas Standard (MP) cheeses differ mainly on texture, flavor and cooking applicability. During ripening several biochemical processes occur which modify the structure and composition of cheese. The aim of this study is to evaluate the rate of ripening of these two types of cheeses using Raman spectroscopy. Three commercial PAR and MP were collected and samples were treated for obtaining lipid extract, high molecular weight peptides (hydrochloric acid to pH 4.6) and low molecular weight peptides (12% trichloracetic acid). All samples were analyzed by Bruker RFS 100 spectrometer and 1064 nm laser. Raman spectra of PAR showed a band at 1615 cm⁻¹, attributed to C-CH stretching mode, possibly associated to proteins. Other two bands at 830 cm⁻¹ and 641 cm⁻¹, relative to the Fermi resonance of tyrosine residues were also present in PAR and absent in MP Raman spectra, which indicates a high level of proteolysis in PAR. Both spectra of PAR protein extracts showed highly intense bands at 1650 and 1077 cm⁻¹ associated with amide I and ν(C-N) modes, respectively. The 790 and 600 cm⁻¹ bands, related to [ν(C-C) + ν(CCO)] modes, are associated with tyrosine and phenylalanine residues. The Raman spectra of lipid extracts showed a band at 1440 cm⁻¹ attributed to C-H deformations, with higher intensity in the MP spectra, possibly related with the degree of lipolysis, which less intense in this product. It can be conclude that Raman spectroscopy could be useful for analytical assessment of cheese ripening, manly related to proteolysis.