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Raman spectroscopy as a tool for nondestructive qualitative analysis of pharmaceutical formulations

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The focus of the present study is to discuss the applicability of Raman spectroscopy as a non-destructive and molecule specific tool for the analysis of formulations containing Ciprofloxacin/Ofloxacin and HPMC/C934/C940 (with minimal sample preparation). Raman spectroscopic analysis for those formulations was performed by a low resolution portable Raman spectrometer using 785 nm solid state diode laser (having fiber optic sampling probe). Their Raman spectra were collected over the wave number range from 140 to 2500 cm-1 at room temperature. Ciprofloxacin/Ofloxacin showed prominent characteristic peaks for pyridone nucleus, piperazinyl ring, carboxylic acid and fluorine substituent. In addition, the characteristic peaks at 771.47 and 797.5 cm-1 for Ciprofloxacin and Ofloxacin, respectively, were assigned to fully symmetric vibrational normal mode of the molecules containing C-F bond (responsible for antibacterial activity). Raman spectral patterns of pure drugs were more or less similar considering their important groups. In all formulations, the symmetric stretching vibration of C-O-C group and stretching vibration of C=O group were prominent. This suggests that there was esterification reaction between Ciprofloxacin/Ofloxacin and each polymer. Due to this, probably stable suspensions were formed. In spite of interaction, the stretching vibration of C-F group of both drugs remained nearly unaltered in all formulations. This suggests that the important groups (responsible for stable suspensions having unaltered antibacterial activity) could be detected by following Raman spectroscopic analysis. From the above mentioned information, it may be concluded that such an analysis could also be performed as a useful tool for the identification of compounds in pharmaceutical formulations.

Biography

Subhashree Sahoo has submitted her PhD thesis to Sambalpur University, Orissa, India in December, 2013. She completed her Postgraduate degree in Pharmacy from Biju Pattnaik University of Technology, India. At Post graduation level, Pharmaceutics was her special paper. Currently, she is working as an Associate Professor at Kanak Manjari Institute of Pharmaceutical Sciences, Rourkela, India. So far, she has published several research papers in different national and international journals.

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