

Europium-sensitized and simultaneous pH-assisted spectrofluorimetric assessment of ciprofloxacin, norfloxacin and gatifloxacin in pharmaceutical and serum samples

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Abstract: A Facile, ultrasensitive and interference free europium-sensitized spectrofluorimetric method was developed for the simultaneous determination of ciprofloxacin (CFLX), norfloxacin (NFLX), and gatifloxacin (GFLX) in their mixture. A coordination complexes of Eu^{3+} –CFLX/NFLX/GFLX were formed and the coordination was determined using the mole ratio method of continuous variation of equimolar solutions. It was found that the luminescence intensity of Eu^{3+} for these complexes in their mixtures is quite sensitive to three variant sets of pH, 6.0, 5.5 and 3.5 and excitation wavelengths (λ_{ex}), 365, 340 and 395 for CFLX, NFLX and GFLX, respectively. Thus a dual-controlled luminescence of smoothly dynamic reversibility is achieved where a reversible on/off switchable emission of one system was observed by tuning its optimal values of pH and λ_{ex} to the optimal ones of the second and so on for the third. The monitored luminescence intensity of the system showed a good linear relationship with the concentration of CFLX over the range of 5×10^{-8} to $1 \times 10^{-6} \text{ mol L}^{-1}$ with a correlation coefficient of 0.995, for NFLX within a range of 5×10^{-8} to $1.8 \times 10^{-6} \text{ mol L}^{-1}$ with a correlation coefficient of 0.990, and for GFLX within a range of 5×10^{-8} to $1.2 \times 10^{-6} \text{ mol L}^{-1}$ with a correlation coefficient of 0.995. The detection limit (LOD) was determined as $1.5 \times 10^{-8} \text{ mol L}^{-1}$ for CFLX, $3.0 \times 10^{-8} \text{ mol L}^{-1}$ for NFLX and $1.6 \times 10^{-8} \text{ mol L}^{-1}$ for GFLX. The limit of quantification (LOQ) is 4.5×10^{-8} , 9.0×10^{-8} , 2.8×10^{-8} for CFLX, NFLX and GFLX, respectively. Moreover, a ternary mixture of CFLX, NFLX and GFLX was satisfactorily assessed with average error <4.5%. This method has been successfully validated to the simultaneous and selective determination of CFLX, NFLX and GFLX in pharmaceuticals samples with recoveries of 100.2 ± 2.1 , 99.6 ± 2.5 and 103.1 ± 2.9 , respectively.