TITLE: ***Development of analytical methods for quantitative determination of dyes in textile effuents.***

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ABSTRACT

It was used in this work the UV-vis spectrophotometry associated with a multivariate calibration model, Principal Component Regression (PCR), for individual and simultaneous quantification of ternary mixtures of reactive dyes in a sample of industrial effluent as well as effluents obtained in laboratory. Three calibration sets were set up, identified as groups I and II, containing the following dyes: Yellow Procion HE4R 100%, Navy Blue Procion HER 150% and Blue Procion HEGN 125% in different concentrations and a third set, group III, containing the following dyes: Blue Procion HEGN 125%, Navy Blue Procion HER 150% and Blue Remazol 3R. In order to obtain the calibration curve, the Centroid-Simplex-type experimental planning was used, represented by a triangle with three axial points. The spectral region selected for the calibration curve samples as well as its respective effluents was between 230 and 705 nm. The number of principal components included in the model was of 3 for group I and 4 for groups II and III. The forecast capacity and the model adjustment were evaluated by means of the variance analysis and the linear regression of the obtained results. The dyes percentages, Yellow Procion HE4R 100%, Navy Blue Procion HER 150% and Blue Procion HEGN 125% that were not fixed in the fiber in the industrial dyeing process were respectively, 47.40%, 10.99% and 24.72%, whereas in effluents obtained in laboratory, the percentages ranged between 1.85 to 5.68%, 44.43 to 48.02% and 30.90 to 33.52%. In group II, these percentages were of 48.05 to 49.00%, 32.53 to 36.31% and 60.31 to 64.58% respectively for the dyes Yellow Procion HE4R 100%, Navy Blue Procion HER 150% and Blue Procion HEGN 125%. And in group III, the percentages of dyes that were found in the effluents obtained in laboratory ranged between 48.20 to 59.65% for the Blue Procion HEGN 125%, 14.94 to 28.19% for the Navy Blue Procion HER 150% and 67.92 to 74.79% for the Blue Remazol 3R. The results showed the viability of the method for the determination of dyes in a mixture with no need of separation processes and where there is a substantial spectral superposition in the UV-Vis region.

Keywords: Dye. UV-vis Spectrophotometry. Multivariate Calibration. Principal Component Regression.