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Application of Experimental Design for Optimization of Diffusive Liquid Phase Microextraction of Methylphenidate in Water Samples

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Diffusive Liquid Phase Microextraction (DLPME) as an efficient and rapid technique coupled with UV-Vis spectrophotometry – photo diode array detection was used in this research for extraction and measurement of methylphenidate (MPh) in water samples. This extraction method, is based on "Homogeneous" and "Dispersive" liquid liquid extraction, and used of a ternary liquid system an organic solvent (lighter than water), as the extractor phase; diffuser solvent and aqueous sample solution [1]. After the extraction, the analyte carrier; an organic drop is introduced into the UV-Vis cell for determination of MPh. In the experimental section, main parameters which are affected on the extraction such as kind of organic solvent, diffuser solvent, phase volumes, extraction time, pH of sample solution, rate and time of centrifuge and effect of surfactant were optimized with "one variable-at-a-time" (univariate) process. But univariate is a strategy based on experience that does not guarantee the attainment of a true optimum of the extraction conditions [2]. Conversely, the chemometric approach relies on a rational experimental design, which allows the simultaneous variation of all experimental factors, saving time and materials [3]. Thus in the present study experimental design is applied to determine in an efficient way the set of conditions that are required to obtain a process with desirable, often optimal, characteristics [4]. For these reasons the microextraction procedure of methylphenidate (MPh) in water samples has been screened by a fractional factorial design with a two-fold repetition of the center, in two levels. The optimization of seven operational parameters was carried out in a set of experiments developed by experimental design, which allow a rapid optimization with a minimal number of experiments. In this case, a surface response design with a two-fold repetition of the center and the multiple data analysis was employed. This comprises a total number of 40 experiments. Experimental design and statistical evaluation of the data obtained were made by means of the software package Statgraphics Centurion MINITAB14.

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The study of complex formation between 4-(2-Pyridylazo) resorcinol and lanthanum ion in aqueous and nonaqueous solution at 0.1M ionic strength

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The importance of stability constants in analytical chemistry is not doubt. 4-(2-pyridylazo)resorcinol (PAR) has the reactive groups (a heterocyclic nitrogen, azo group, and o-hydroxyl group) available for possible coordination to metal ions. PAR is a dibasic acid and simultaneously forms the protonated and the normal type of complexes with most metal ions. Spectrophotometric is one of the most powerful methods for the investigation of solution equilibria. [1,2]. The complexation reactions between 4-(2-pyridylazo)resorcinol (PAR) and lanthanum ion in water and mixed water-DMSo at 25^{o}C and 0.1M ionic strength are performed spectrophotometrically. A critical comparison of the various PCA methods on the absorbance matrix data concerning the number of light absorbing species has been made. Knowing of the number of light absorbing species is a critical step for subsequent quantitative and qualitative all solution equilibria studies. Therefore, the nine selected index functions for the prediction of the number of light-absorbing components which contribute to a set of spectra are critically tested using the algorithms implemented in INDICES software. Behind the