

New Approaches for the Determination of Benzodiazepines Using Fluorescence Quenching †

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Abstract: In recent years, ingredients in pharmaceutical formulations have received great attention as possible bioactive chemicals continuously introduced into the environment, often in small concentrations, affecting water quality and the environment. Benzodiazepines (BZPs) are widely consumed by modern society as minor tranquilizers, anxiolytics, and hypnotics. According to data provided by the Argentine Pharmaceutical Confederation, Argentina has shown a growing consumption of psychotropic drugs for more than a decade, a situation that has deepened in the last year due to social and psychological factors linked to the pandemic. The objective of this work is to propose a strategy for the indirect determination of three BDZs (alprazolam, clonazepam, and diazepam) using the attenuation that they generate in the fluorescent signal (quenching effect) of the serum albumin molecule bovine (BSA). Different experimental parameters that influence the quenching effect of BDZs on BSA were studied ($\lambda_{ex} = 280$ nm, $\lambda_{em} = 340$ nm, slits: 5/5). The proposed development represents a useful and valuable tool emulating the analytical efficiency of the official methodologies. Also, the implemented strategy will be incorporated into schemes that combine high-resolution liquid chromatography associated with fluorescent detection to partially or automate the methodology and allow a simultaneous determination of the BDZs above within ambiental samples, with advantages concerning low cost and simplicity.

Keywords: benzodiazepines; fluorescence quenching; molecular fluorescence.

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Conflicts of Interest

The authors declare no conflict of interest.