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Optimizing and Quantifying Preliminary Analysis of Sedative-Hypnotics: The Role of Spot Tests and Quantitative Thin Layer Chromatography (qTLC)

Sedatives-hypnotics are commonly encountered in criminal cases, due to their widespread use as prescription drugs and high potential for abuse. The analysis of these drugs is carried out using preliminary spot tests and instrumental analysis for confirmation and quantification. However, there is a need for sustainability approach which can be attained through better optimization of the methods. This study integrates a review on the spot tests and quantitative thin layer chromatographic techniques, with an original work on Alprazolam, focussed on optimization of the spot test and thin layer chromatography. This paper examines the advantages and drawbacks of the spot tests and thin layer chromatography, highlighting the requirement of improvisation of these methods, which align better with Green Analytical Chemistry (GAC) principles. The findings from the study reflects an improvement in accuracy and a better reagent usage. The optimization ensures a reduction of the use of hazardous chemicals, which contributes towards sustainability and safer analytical practices. This work aligns with the United Nations Sustainable Development Goals –3 (Good Health and Well-being), 12 (Responsible Consumption and Production), and 13 (Climate Action). It further promotes reduced environmental footprint.

Keywords: Sedative-Hypnotics; Thin Layer Chromatography (TLC); Spot Tests; Green Analytical Chemistry; Method Optimization; Forensic Toxicology

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