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Near-near-infrared thermal lens spectroscopy to assess overtones and combination bands of sulfentrazone pesticide

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Thermal lens spectroscopy (TLS) in the near-near-infrared region was used to explore the absorptions of overtones and combination bands of sulfentrazone (SFZ) herbicide diluted in methanol. This spectroscopic region was chosen in order to guarantee that only thermal lens effect is noted during the experimental procedure. The results showed that it was possible to detect very low concentrations (~2 ng/μL) of SFZ in methanol by determining its thermal diffusivity or the absorption coefficient due to the $3\nu(\text{NH})+1\delta(\text{CH})$ combination band. This minimum SFZ concentration is the limit observed by chromatography method. The findings demonstrated that the TLS can be used for precise and accurate assessment of pesticides in ecosystems. Besides, the $3\nu(\text{NH})+1\delta(\text{CH})$ combination band at 960 nm can be used as a marker for SFZ in methanol.

Keywords: Thermal Lens spectroscopy; Thermal diffusivity; Overtones; Combination bands; Near-near-infrared spectroscopy; Sulfentrazone.

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