



Determination of thiacloprid in teas by its quenching on terbium luminescence

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Thiacloprid is a broad-spectrum neonicotinoid insecticide, used against sucking insects and chewing insects. It is widely used in many crops, such as rice, fruits, and vegetables. There are many analytical methods for its determination, mostly liquid chromatography. However, the development of simple methods of analysis can provide an interesting alternative for routine analysis. In this work, we report the use of time-resolved luminescence for the quantitation of thiacloprid in tea samples. Terbium ions are commonly used in analytical chemistry in terbium-sensitized luminescence, which presents some exciting characteristics: large Stokes shift, narrow-band emission, and a long luminescence lifetime. The most common approach consists in the improvement of the analytical signal when terbium ions form chelates with appropriate fluorescence organic analytes. In this work, the approach is different, consisting in the measurement of the quenching produced by thiacloprid on the terbium luminescence.

After the optimization of instrumental (wavelengths, detector voltage, slits, delay time, and gate time) and chemical (terbium concentration, pH, dodecyl sulfate sodium concentration) variables, the analytical method presents a detection limit of $0.06 \mu\text{g mL}^{-1}$ and a linear response between 0.2 and $7 \mu\text{g mL}^{-1}$. For the analysis of tea samples, a solid phase extraction methodology was optimized and validated. This analytical method complies with the maximum residue limit for thiacloprid in tea samples in the European Union, 10 mg kg^{-1} . Recovery experiments were carried out in spiked tea samples, obtaining excellent recovery yields. These results were compared with an HPLC reference method, obtaining no significant differences. Hence, this novel approach can be used for routine control of thiacloprid in teas, although positive results would need additional confirmation by mass spectrometry.

