A NEW DIRECT PHOTO-INDUCED FLUORESCENCE METHOD COUPLING UV LAMP IRRADIATION AND LASER DETECTION

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Introduction

Pesticides are widely used in agriculture to improve productivity. Thus, their residues can be found in crops, soils and surface water. However, their persistence in the environment is a major matter of concern due to their toxicity and possible carcinogenicity. Therefore, it is important to develop sensitive and selective analytical methods for determining pesticides in surface water, groundwater, soils. In this works, we have developed a new direct analysis method for the simultaneous determination of fipronil, oxadiazon and isoproturon, tree pesticides naturally non-fuorescent. The method is done in only a single step and is a new evolution of the Direct Laser PIF Methods previously published [1-2].

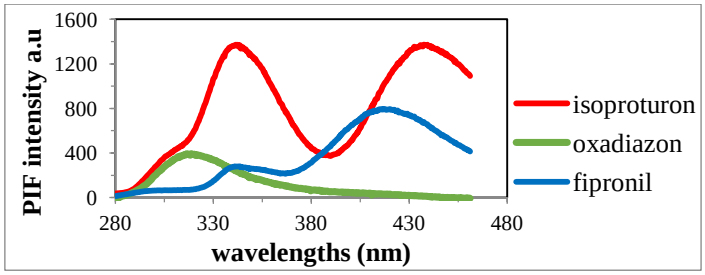
Materials and Methods

Non fluorescent compounds are irradiated by a power UV lamp, (300 w). The so formed photoproducts are excited by a tunable laser (Nd – YAG-OPO) and detected by a spectrophotometer and high-sensitive ICCD camera.

Results and Discussion

Fipronil, oxadiazon and isoproturon exhibited no native fluorescence, while UV irradiation yielded the formation of strongly fluorescent(s) photoproduct(s). These photoproducts were obtained after 1 min of UV irradiation and the emission spectra were recorded after laser excitation (figure 1). The analytical performances of our method are satisfactory compared to the classical PIF method. The calibration curves are linear and over two order of magnitude. Low limit of detection and quantification (in the ng mL^{-1} range) were obtained in 80:20 (v/v) methanol-water mixture.

Figure 1 : fluorescence emission spectra of fipronil, oxadiazon and isoproturon in the 80:20 (v/v) methanol-water mixture.



Conclusion

We have demonstrated in this work that UV irradiation coupled with laser excitation is a sensitive, rapid and reproducible method for the analysis of fipronil, oxadiazion and isoproturon pesticides in water samples.

Bibliography

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