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Indoor and outdoor determination of pesticides in air by ion mobility spectrometry

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Abstract

The use of ion mobility spectrometry (IMS) has been evaluated as analytical methodology to detect and evaluate the occupational exposure to pesticides. The developed IMS methodology was used, in positive and negative modes, to determine the presence of pesticides in air and to evaluate possible inhalation exposures of workers and users based on active sampling on Teflon membranes and direct thermal desorption IMS. The negative IMS mode was used to determine bensulfuron, clorpyrifos, diniconazole, diuron, flutolanil and imidacloprid, while the positive mode was employed to evaluate formetanate, metalaxyl, metamitron, metribuzin, paclobutrazol and pirimicarb. The IMS measurements provided limits of detection from 8 pg to 600 pg. Indoor air samples, from phytosanitary plants, and outdoor samples, obtained from pesticide treatments in a local farm, were analysed providing pesticide air concentrations in the range of 0.04 to >0.25 mg m⁻³. Occupational exposure of workers and pesticide users were evaluated and compared with values recommended by the authorities, providing useful information to improve the prevention programs in the phytosanitary field.

Graphical abstract.

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