ANALYSIS AND OCCURRENCE OF 22 MEDIUM TO POLAR PESTICIDES IN GROUNDWATER OF CATALONIA: AN APPROACH BASED ON ON-LINE SOLID PHASE EXTRACTION-LIQUID CHROMATOGRAPHY-ELECTROSPRAY-TANDEM MASS SPECTROMETRY DETECTION.

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Pesticides are used in large volumes and residues of the parent compounds and/or their transformation products may reach aquifers and alter groundwater quality being the main source of diffuse contamination. The EU directive 2006/118/EC on the protection of groundwater against pollution and deterioration sets 0.1 µg/L and 0.5 µg/L as quality standards for individual and total pesticides (including their relevant metabolites, degradation and reaction products), respectively. This work describes an automated methodology based on on-line solid phase extraction-liquid chromatography-electrospray-tandem mass spectrometry (on-line SPE-LC-ESI-MS/MS) for the determination of twenty two pesticides in groundwater, and its application to the analysis of a large number of samples collected from different aquifers of Catalonia, in areas where agricultural practice is significant. Sample preconcentration is performed by passing 5 mL of the sample through PLRPs cartridges (for analysis of 16 pesticides measured in the positive ionization mode) and through Hysphere-Resin GP cartridges (for analysis of 6 pesticides measured in the negative ionization mode). Further LC-MS/MS determination is performed in the selected reaction monitoring (SRM) mode, by recording two SRM transitions per compound, thus obtaining four identification points. The methodology developed allows the determination of the target compounds at the pg or low ng per liter level with satisfactory precision and accuracy and is well suited for routine monitoring. Its application to the groundwater samples collected has revealed diazinon, simazine, propanil, diuron and atrazine (present in more than 75 % of the samples) as the most ubiquitous compounds. Approximately 23 % of the samples investigated had individual pesticides levels above 100 ng/L and 7 % total pesticides levels above 500 ng/L. Concentrations higher than 100 ng/L were found only for atrazine, simazine, terbutylazine, desethyl atrazine, deisopropyl atrazine, and diuron in a few samples.

Acknowledgements
This work has been financially supported by the Catalan Water Agency (Agència Catalana de l'Aigua) and by the Spanish Ministry of Science and Innovation [CTM2005-25168-E and CGL2007-64551/HID] and reflects the author's view. The EU is not liable for any use that may be made of the information contained in it. Merck is acknowledged for the gift of LC columns and Spark Holland for the gift of on-line SPE cartridges. Cristina Postigo acknowledges the European Social Fund and AGAUR (Generalitat de Catalunya, Spain) for their economical support through the FI pre-doctoral grant.