Modeling the fate of the Pharmaceuticals in an urban aquifer. Besòs River Delta case study (Barcelona, Spain).

A. JURADO[12]*, E. VAZQUEZ-SUÑE[1], J. CARRERA[1], E. PUJADES[12], R. LOPEZ-SERNA[3], M. PETROVIC[4] AND D. BBARCELÓ[3,4].

[1]IDAEA-CSIC (GHS, Department of Geosciences), Jordi Girona 18-26, 08034, Barcelona, Spain. (*annajuradoelices@gmail.com).
[2]GHS, UPC-Barcelona Tech, Jordi Girona 1-3, 08034, Barcelona, Spain. (estanislao.pujades@gmail.com)
[3]IDAEA-CSIC (Department of Environmental Chemistry) , Barcelona, Spain. (dbcqam@cid.csic.es)
[4]ICRA, Emili Grahit 101,17003 Girona, Spain. (mpetrovic@icra.cat).

Pharmaceutically active compounds (PhACs) are a matter of growing concern because they might produce potentially harmful effects on ecosystems and human health. The incomplete removal of some PhACs during conventional waste water treatment represents the main source in surface and ground waters. As a result, groundwater quality can be deteriorated by the presence of PhACs. Thus, understanding their fate in the aquifer is a key environmental issue.

In this work, a multicomponent reactive transport modeling will be used to investigate the fate of the PhACs in an urban aquifer which main recharge source is the polluted River Besòs in Barcelona (Spain). River Besòs flow is heavily dependent on seasonal rainfall and it receives large amounts of effluents from waste water treatment plants. Therefore, a wide range of PhACs may be present in groundwater at similar levels or even higher than the River Besòs.

Prior inspection of the collected data suggests different behavior of the PhACs in the aquifer. As an example, ibuprofen, gemfibrozil, sulfadiazine and bezafibrate present a significant removal in when river water infiltrates the aquifer, with elimination rates ranging between 60–80%. However, other PhACs such as carbamazepine are highly persistent with elimination rates that usually below 10%. It is important to understand and quantify the different attenuation behavior of PhACs to know whether the groundwater of Besòs River Delta can be use to other purposes, such as supply ones, apart from street cleaning and water plant.

www.minersoc.org
DOI:10.1180/minmag.2013.077.5.10