**Contamination of various types of Parisian sewage sludge by a wide range of priority and emerging micropollutants**

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The elimination of micropollutants, especially hydrophobic ones (log Kow > 4), through sorption to solids during primary and biological treatments of wastewater has been highlighted by several studies (Byrns 2001; Clara *et al.* 2007). This leads to the presence of various pollutants in raw sewage sludge, such as linear alkylbenzene sulfonates (LAS), phthalates (PAEs), polychlorobiphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs), which are harmful for the environment and humans due to their persistance or toxicity. In addition, treated sludge are mainly reuse as agricultural amendment in Europe (about 60%), leading to the spreading of these pollutants onto agricultural soils.

In this context, the Water Environment and Urban Systems Laboratory (LEESU) and the public sanitation service of Paris (SIAAP) launched a study on the sludge treatments in Paris to 1) assess the contamination of the different types of sewage sludge by a wide range of priority and emerging micropollutants, and 2) to determine the efficiency of various sludge treatments, as well as the elimination mechanisms. This study have been performed in close partnership with the Laboratory of Environmental Biotechnology (LBE) and the Institute of Analytical Sciences (ISA). This communication aims at presenting the results on quality of sewage sludge and the removal effciency of sludge treatments.

In that purpose, the sludge treatments from three wastewater treatment plants (WWTPs), supervised by the SIAAP, have been sampled at different stages of treatment. Thus, 70 micropollutants were monitored during 7 campaigns (from 2013 to 2014) in raw, centrifuged, anaerobically digested, thermally dried sludge and sludge cakes. These pollutants include alkylphenols (APs), LAS, PAEs, PAHs, PCBs, perfluorinated acids (PFAs), pharmaceuticals and hormones (PPHs). In addition, the same compounds were also monitored in centrifuged and condensed waters from centrifugation and thermal drying processes.

Very high concentrations of LAS (100-10,000 mg/kg DM - dry matter) were found in all types of sludge followed by di-2-ethylhexyl phthalate (DEHP) (10,000-100,000 µg/kg DM) and fluoroquinolones (1,000-100,000 µg/kg DM). APs were measured at intermediary concentrations in Parisian sludge, lying in the 2,000-20,000 µg/kg DM range. Finally, other PAEs, PAHs, PCBs, PFAs and the remaining PPHs were all found at lower concentrations, i.e. below 1,000 µg/kg DM. Results highlighted the increase of concentration through sludge treatment for APs, DEHP, LAS, PAHs and PCBs. However, such increase does not mean there is no removal, it could result from a lower removal than dry matter removal (Mailler *et al.* 2014). PFAs and PPHs are rather more eliminated than dry matter as their concentration decrease.

In addition, the data on centrifuged and condensed waters highlighted a removal through transfer to centrate and condensate for APs, LAS, PAEs, PAHs, PFAs and several PPHs. Some compounds (fluoroquinolones, LAS and PAHs) are transferred within the particulate phase (release of particles from sludge) while others are also present in the dissolved phase (APs, PAEs, PFAs and PPHs). This suggests that biodegradation is not the unique removal pathway during sludge treatments.

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