

Levels of Polybrominated diphenyl ethers in seawater and marine sediments. European Water Framework Directive

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Introduction

Since 2000, Catalan Water Agency (ACA) and Mass Spectrometry Laboratory of IDAEA-CSIC, work together on the analysis of Persistent Organic Pollutants (POPs) in marine ecosystems in order to implement the Water Framework Directive 2000/60/EC (WFD) in Catalonia (Spain) (figure 1). In 2008, the European Parliament and Council established Environmental Quality Standards (EQS) for priority substances in waters (Directive, 2008). Two types of EQS were established: annual average concentrations (AA-EQS) and maximum allowable concentration (MAC-EQS). The implementation of the Directive implies that pollutants have to be periodically monitored in different matrixes (water, sediment and biota). Therefore, seasonal samplings of seawater and sediment are carried out in the established points.

Especially for PBDEs, the levels imposed by these regulations and the presence of these contaminants in seawater are very low. Therefore, sensitive instrumental analytical methods are necessary, such as GC-HRMS, to analyse and to reliably quantify these compounds (Santos & Galceran, 2002).

In the case of PBDEs, the EQS are established for the sum of congeners 28, 47, 99, 100, 153 and 154. These congeners are the main components of the Penta-BDE commercial mixture, which was banned by European Union (de Wit, 2002). Deca-BDE mixture is composed mostly of BDE#209, which is not banned yet.

The annual average concentration (AA-EQS) for inland surface waters is 0.0005 μ g/L and AA-EQS for other surface waters is 0.0002 μ g/L (Directive, 2008). No EQS exist for sediments, but the control consists of ensuring that levels of contamination will not increase.

Since 2000, more than 300 water and sediment samples have been analysed. In this work we present the results obtained in the analysis of PBDEs in seawater and marine sediments of the most affected sites along the Catalan coast during 2008.

Table 2 shows the results of Σ (BDE#28+ BDE#47+ BDE#99+ BDE#100+ BDE#153+ BDE#154) in marine sediments related to the water samples. In Table 3 the contribution of BDE#183 and BDE#209 to the Σ PBDEs in marine sediments is included. There is revealed that the high contribution in the sediments is due to the BDE#209.

Table 2. Results of Σ PBDEs for marine sediments

Site	BeA	BeB	BeC	BeD	BTA	LLO ND Sup.	LLO ND
Total of legislated PBDEs (ng/g dw)	10.10	3.12	31.53	8.81	97.78	1.38	2.84

Site	LLO SD Sup.	LLO SD	EmisLLO	EB C	EB D	BFA	BAL
Total of legislated PBDEs (ng/g dw)	1.03	22.60	4.52	0.16	0.09	0.19	0.21

Table 3. Results of Σ PBDEs (including BDE#183 and BDE#209) for marine sediments

Site	BeA	BeB	BeC	BeD	BTA	LLO ND Sup.	LLO ND
Total PBDEs (ng/g dw)	2181.88	3960.14	1769.74	3049.46	2578.95	320.38	645.37

Site	LLO SD Sup.	LLO SD	EmisLLO	EB C	EB D	BFA	BAL
Total PBDEs (ng/g dw)	281.96	1197.48	610.25	17.22	20.62	14.92	30.07

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References

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