

Degradation of polybrominated diphenyl ethers in the environment

YANG-HSIN SHIH*, CHIH-PING TSO, YU-HUEI PENG, SIANG-CHEN WU

Department of Agricultural Chemistry, National Taiwan University, Taipei 106, Taiwan

*correspondence: yhs@ntu.edu.tw

Polybrominated diphenyl ethers (PBDEs), one group of emerging contaminants, belong to a large family of brominated flame retardants and persistent organic pollutants in the environment. Heavily brominated DEs were more widely used; while components of the penta- and octa- BDEs are considered more toxic and undergo bioaccumulation [1]. In Asia such as Taiwan, China, and India, some farms were polluted by PBDEs. In our study of plant uptake of PBDEs, PBDEs could contaminate our food through crops grown in environmental media such as soils. The degradation of PBDEs in our environment is urged to understand their environmental fate. Photocatalytic degradation of PBDEs with UV light has been proposed in the literature and was confirmed a rapid debromination process under sunlight in Asia such as Taiwan [2]. Since the sunlight cannot penetrate into the some environmental media deeply, we studied the reductive catalysis of PBDEs with zerovalent metals. The debromination and adsorption of PBDEs on irons were found during the reactions [3]. The continuous degradation of adsorbed PBDEs on irons was observed [4]. The effect of some environmental factors on the degradation was also studied [5]. On the other hand, microbes do not easily degrade PBDEs in soils and the microbial degradation of PBDEs took a long time. The synergistic combination of microbial and zerovalent metals on PBDE degradation was found [6]. Some recent degradation studies of PBDEs will be discussed, including our recent enzymatic works. Some discussions about the environmental fate of PBDEs including these transformations will be presented.

[1] Darnerud, Eriksen, Jóhannesson, Larsen & Viluksela, *Environ Health Perspect* (2001) 109, 49-68.

[2] Shih & Wang, *J Hazard Mater* (2009) 165, 34-38.

[3] Shih & Tai, *Chemosphere* (2010) 78, 1200-1206.

[4] Peng, Chen & Shih, *J Hazard Mater* (2013) 260, 844-850.

[5] Shih, Chen & Su, *Appl Catal B* (2011) 105, 24-29.

[6] Shih, Chou, Peng & Chang, *Bioresour Technol* (2012) 108, 14-20.