

Table 4-6. Studies of 6PPD and 6PPD-q concentrations in sediment

Location	Information	Concentration (ng/g)	Lab Instrumentation	Detection Limit
China [Pearl River Delta, Pearl River Estuary, South China Sea] (Zeng et al. 2023)	In 2021, researchers collected 32 samples along the Pearl River Delta, 21 samples in the Pearl River Estuary, 20 samples on the coast of the South China Sea, and 12 samples in the deep-sea regions of the South China Sea. These samples were analyzed for a range of p-phenylenediamines and quinone transformation products, including 6PPD and 6PPD-q. Both compounds were detected in at least 75% or more of the samples collected, with the highest concentrations found in the Pearl River Delta.	The concentrations of 6PPD and 6PPD-q in sediment were found to be [median (range)]: 6PPD: River sediment: 14.4 (0.585–468) Estuary sediment: 3.92 (1.49–5.71) Coastal sediment: 1.82 (1.07–11.1) Deep-sea sediment: 2.66 (<MDL–2.69) 6PPD-q: River sediment: 9.03 (1.87–18.2) Estuary sediment: 2.00 (<MDL–4.88) Coastal sediment: 1.27 (0.431–2.98) Deep-sea sediment: 2.71 (<MDL–3.02)	LC-MS/MS	MDL (ng/g): 6PPD: 0.015 6PPD-q: 0.043
China [Jiaojiang River] (Zhu et al. 2024)	In October 2022, researchers collected paired surface-water (n=30) and sediment samples (n=30) from the Jiaojiang River in the southeastern region of China. The Jiaojiang River is the largest river in Taizhou City. Sediment samples (n=3) were collected from the top 5 cm at each location and composited. Samples were extracted and tested for 9 PPD and 7 PPD-q. In sediment, 6PPD and 6PPD-q were more frequently detected than the other PPD and PPD-q congeners analyzed, with a detection frequency of 100% and 80%, respectively. Concentrations of 6PPD-q in sediment were significantly correlated with 6PPD in sediment (rs=0.77; p < 0.01).	The concentrations of 6PPD and 6PPD-q in sediment were found to be [median (range)]: 6PPD: 25 (1.6–172) 6PPD-q: 19 (<LOD–46)	LC-MS/MS	MDL (ng/g): 6PPD: 0.075 6PPD-q: 0.039
United States and Canada (Wu, Venier, and Hites 2020)	In 2016, researchers collected 21 e-waste dust samples in an e-waste dismantling facility in Ontario, Canada. Residential samples were collected in Ontario, Canada, in 2015 (n=20) and in Indiana, United States, in 2013 (n=12). In 2013, 10 sediment samples were collected in the Chicago Sanitary and Ship Canal. From 2018 to 2019, 20 air samples were collected in Chicago. Samples were tested for various antioxidants and ultraviolet filters, including 6PPD. 6PPD was detected in 100% of the e-waste dust samples, and in 70%–75% of all other sampled media.		LC-MS/MS	MDL: Air: 0.02 pg/m ³ Dust and sediment: 0.06 ng/g

Notes: LC-MS/MS=liquid chromatography / tandem mass spectrometry, LOD=limit of detection, MDL=method detection limit, ng/g=nanogram per gram, PPD=para-phenylenediamines, PPD-q=para-phenylenediamines-quinones

References

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- Zeng, Lixi, Yi Li, Yuxin Sun, Liang-Ying Liu, Mingjie Shen, and Bibai Du. 2023. "Widespread Occurrence and Transport of p-Phenylenediamines and Their Quinones in Sediments across Urban Rivers, Estuaries, Coasts, and Deep-Sea Regions." *Environmental Science & Technology*, January, acs.est.2c07652. <https://doi.org/10.1021/acs.est.2c07652>.
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