The global distribution of perfluorinated compounds and long-range transport via marine water in the Arctic, Atlantic Ocean and Antarctic coast

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Introduction

Since the ubiquitous occurrence and potential toxicity to human beings, the perfluorinated compounds (PFCs) have attracted more concerning in the recent years. In 2010, one of the PFCs, perfluorooctane sulfonate(PFOS) was added to Annex B of Stockholm Convention on Persisitent Organic Pollutants(POPs), which means the official ban in the whole world. However, the emission of some other PFCs from the manufactures and products are still potential threats to the environment and living creatures. Perfluorinated carboxylic acids(PFCAs) and perfluorinated sulfonates (PFSAs) are very soluble, and the PFOS reside in marine surface water recently was estimated similar to the estimated release amount. The persistent PFCs could be transported via ocean current to polar areas which results the occurrence in polar water and biota. In this study, the global distribution and long-range transport of PFCs were investigated in marine surface water.

Materials and methods

78 surface seawater samples from Antarctic coast, Atlantic and Arctic Ocean were collected in 2010-2011. After filtered onboard using glass fibre filters (GFF, GF/C, Whatman, Ø 47mm, >1.2 μ), the dissolved-phase samples were spiked with mass labelled internal standards, and then solid phase extracted by pretreated Oasis WAX cartridges (30 mg, 6cc). The cartridges were eluted by 0.1 ammonium hydroxide after dried. The extracts were reduce to 150 μL under nitrogen flow and stored at -20°C until instrument analysis.

The measurement was performed on an HPLC system (Agilent Technologies) with a Synergi Hydro RP 80A column (150 × 2 mm, 4 μm) by Phenomenex, combined with a Synergi 2 μ Hydro RP Mercury (20 × 2 mm, 2 μm) column. An electrospray ionization (ESI) interface in negative ionization mode were applied for the triple-quadrupole mass spectrometer (Applied Biosystem/MDS SCIEX, API 3000).

Result and discussion

The levels were compared to former studies to figure out the trend of PFCs release to the environment. The dynamics of long-range transport of PFCs were investigated and the fates of different compounds were predicted.