Microscopic observation and geochemical characteristics of suspended particulate matter in water source of Beijing, China

JI HONGBING[1,2]*, TANG LEI[1], LI CAI[1], GUO, XINYUE[1], LIU SHIRONG[2]

[1]Department of Environmental Engineering, Civil and Environmental Engineering School, University of Science and Technology Beijing, Beijing 100083, China

[2]Key Laboratory of Environmental Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences.

(*correspondence: hongbing.ji@yahoo.com)

Colloids have an important role in the transport of trace metals in the hydrological cycle. We investigated the metal contents in various phases and the difference in terms of shapes, morphology and composition of colloids and to link them to the potential sources as well as the colloids influence on heavy metals transportation. The concentrations of heavy metals in dissolved phase and particulate the distribution features was similar, but there is no special trend for the distribution of heavy metals at each site. All of them could be as a consequence of mining minerals and frequently transportation in the area. The mineral phases of colloidal particles were mainly iron oxides, silicate minerals and small amount of carbonate. The source of metal-bearing colloids are classified into three types: natural, anthropogenic and biogenic. They were found to be the primary controlling factors for controlling heavy metals removal and transformation in water environment system. Furthermore, we the first found nanocolloidal metacinnabar in the fresh water system.

It was also found that the carbon and nitrogen isotopic ratios in suspended particulate matter were -29.34 ‰— -25.91‰ and -0.96‰— +6.73‰, respective, in summer, while they were -30.75 ‰— -25.75‰ and -0.83‰— +9.67‰, respective, in winter. There were obvious seasonal variations in isotopic compositions observed in the study area. The relationship between SPM weight and POC indicated that mineral matter coming from the erosion of terrigenous soils was the main component of SPM. The suspended particulate organic matter was derived mainly from SOM, C3 and macrophyte in summer, while it was derived from plankton in winter. δ^{15}N ratios reflected the combined results of information of sources and a series of biogeochemical processes. Although δ^{15}N ratios could provided limited information of sources, it can be used to trace some special biogeochemical processes.