

Effect of water pollution on the northwest part of Chaohu Lake

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Abstract. This paper gives a brief description of the water quality of the Chaohu Lake from organic analysis aspect, and indicates the serious effect of the water pollution at drinking water production.

Keywords: Chaohu Lake; water pollution; PAHs; biogenic organics; drinking water.

In early 1970s, the local authority of Chaohu Lake region became aware of the problems more and more and had a kind of survey study started in the beginning of 1980s. Some publications appeared at that time (Liu, 1987; Meng, 1988; The Environmental Protection Institute of Anhui Province, 1986) indicated that: the lake water is polluted and the water quality is in the last rank among the five lakes; the biggest pollutants conveyance to the lake is one of the tributories — the Nanfei River which flows through the provincial capital city— Hefei; and receives large amount of untreated domestic and industrial waste water. The seriously polluted area is located at the river mouth and near by water body; the lake is a blue-green alga eutrophic lake

The conclusions mentioned above are based on the physical and chemical analyses or the ecological features of the phytoplankton community such as dominant species, saprobic indicators and so on. The items analyzed are suspended solid, hardness, pH, dissolved oxygen, BOD, COD, chlorides, $\text{NH}_3\text{-N}$, oil, CN^- , Hg, Cr, As, Cu, Pb, Cd, Mn, Zn, Co, lindane, DDT, TN, TP, and bacteria of water samples. As a part of the research project "The Ecological Effect of the Chaohu Lake Pollution", an organic analysis of the water samples were taken from the downstream of the Nanfei River, the river mouth, and the northwest part of the lake in order to achieve a better understanding of the lake water pollution.

It is observed that the river water is dark colour, turbid, terrible smell, and with acidity pH 7; the lake water looks yellowish but colloidal and is very difficult to be cleared; the pH is near to 8.

GC/MS/COM analysis shows (Zhu, 1991) that more than ninety five organic components, of which fifty-four were identified tentatively, were found from the downstream and the river mouth, and more than seventy with sixty-six identified tentatively were found in the lake water.

Many organic pollutants, such as PAHs, ordered on top priority by documents, manifest in river and lake waters, but more are in the river water.

The concentration of PAHs in the water determined by HPLC (Zhu, 1992) is phenanthrene (0.37), anthracene (0.09), fluoranthene (0.63), pyrene (1.36), benzo (a) anthracene (0.17), benzo (k) fluoranthene (0.012), benzo (a) pyrene (0.007), and benzo (ghi) perylene (0.005) $\mu\text{g/L}$, in total is 2.64 $\mu\text{g/L}$ at river mouth. PAHs were also detected in lake water but in much lower concentration. The amount of total PAHs is 0.058 $\mu\text{g/L}$, 0.035 $\mu\text{g/L}$, at different sites in northwest part of the lake.

Quantitatively, about one third of the total organics detected in river and lake samples is hydrocarbons including benzene and aliphatic hydrocarbons. This implies the water is serious polluted by oil from busy engine boat navigation.

As for the existing situation of the organic substances in turbid lake water, the results of GC analysis of suspended sediment and particle-free water samples show that the organic components exist in two phases, with the ratio of 0.4 (in sediment) to 1 (in particle-free water).

The results of fluorescence analysis of the methanol extracts show the existence of humic materials by a peak at excitation spectrum around 390 nm, and a peak at emission spectrum around 450 nm. The quantity of humic materials in lake water is about two fold of that in the river water.

Some algae were collected from the lake and an analysis of the culture liquid was carried out. The GC/MS results show that the presence of dimethyl disulfide, alpha-pinene, 6-methyl-2-heptanone, azulene, heptadecane and so on.

In 1988, the water supply was held up for a quite a long time since terrible water quality caused by *Microcystis* bloom. In 1989, the water production was broken off since the sand filter was blocked up by diatom bloom. Moreover, the supplied water in summer when algae densely bloomed is always with a strong muddy odour and a terrible taste. All this gives harmful effect on the consumers' health, and causes huge economic loss. It is urgent to protect the drinking water source from algal bloom, it should also be noted that anthropogenic micropollutants in lake water may have long-term effect to human health.

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