

## **Humic Substance Molecules Bound to Iron as Determined by Ultrahigh Resolution Mass Spectrometry**

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Iron is an important micronutrient in aquatic systems. Most of dissolved iron in air-saturated surface waters at circumneutral pH occurs in forms of complexes with natural organic matters such as humic substances. In this study we examined the molecular composition of humic substances bound to ferric iron at circumneutral pH. The ultrahigh resolution mass spectrometry combined with iron stable isotope (iron-54 and iron-56) were used for the identification of molecular signals originated from iron and humic complexes. The humic iron complex signals were detected based on the mass difference of 54- and 56-iron and their relative peak ratio. Subsequently, the compound identification algorithm was employed to determine the molecular composition of humic substance. While several thousands of peaks were detected for the humic substance solution, only a small portion of humic substance molecules were found to coordinate with iron under the condition examined. Aromatic compounds including lignin-like composition was found to be one of major molecular structure with high affinity to iron.