

Increase of Organosulfate Molar Mass with Increasing Urban Air Pollution

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Organosulfates (OSs, esters of sulfuric acid, ROSO_3H) significantly contribute to the SOA yield, accounting for up to 30% of organic matter. Here, thousands of OSs were identified in wintertime aerosols in Beijing by 15T Fourier Transform-ion Cyclotron Resonance Mass Spectrometry. The high molecular weight (500–800 Da) OSs with low H/C ratios and high degree of unsaturation were significantly enhanced during the hazy days, indicating that most of them were freshly formed under stagnant air-pollution episodes. However, in clean days, they were efficiently oxidized into low molecular weight species during long-range transport. Aliphatic OSs were identified with a wide range in carbon-chain length from C_6 to C_{20} . The relative abundance of aliphatic OSs decreased with increased molecular weight, while aromatic-like OSs showed an opposite pattern. The high abundance of aromatic-like together with aliphatic OSs in the Beijing aerosols suggests significant contribution of anthropogenic precursors (e.g. polycyclic aromatic hydrocarbons and aliphatic fatty acids) from fossil fuel combustion and biomass burning, which have potential effects on the physicochemical properties of urban aerosols.