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Efficient Low-Temperature Oxidation of Carbon-Cluster Anions by SO_2 ANDREW LEAVITT, University of West Georgia, RICHARD WYWRAS, WILLIAM WALLACE, Georgia Institute of Technology, DANIEL SERRANO, University of West Georgia, MELISSA ARREDONDO, Georgia Institute of Technology, LOGAN LESLIE, FAROOQ KHAN, University of West Georgia, ROBERT WHETTEN, Georgia Institute of Technology — Carbon-cluster anions, C_N^-, are very reactive toward SO_2 (sticking probability of 0.012 ± 0.005 for C_{27}^- at 25 ^{o}C), in contrast to their inertness toward other common atmospheric gases and pollutants. In flow-reactor experiments at ambient temperature and near atmospheric pressure, primary adsorption of SO_2 by the carbon cluster anions, N = 4 – 60, yields $C_NSO_2^-$ or $C_{N-1}S^-$. The inferred elimination of neutral CO_2 is also detected as meta-stable decay in collision-induced dissociation. At higher temperatures, the reaction of SO_2 with nascent carbon clusters yields $C_{N-1}SO^-$ as well as undetected CO. Such carbon clusters are formed in sooting flames and may act as nuclei for the formation of primary soot particles, and serve as models for the local structural features of active soot particle sites for black-carbon soot. The facile generation of reactive carbon-sulfide and –sulfinate units may therefore have implications for understanding the health and environmental effects attributed to the coincidence of soot and SO_2.

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