Journal of the Air & Waste Management Association

Volume 53, Issue 9, 2003

The Distribution of Particle-Phase Organic Compounds in the Atmosphere and Their Use for Source Apportionment during the Southern California Children's Health Study

DOI:
10.1080/10473289.2003.10466265
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pages 1065-1079

Version of record first published: 22 Feb 2012

Abstract

Atmospheric particulate matter (PM) samples from 12 sites in southern California, collected as part of the Southern California Children's Health Study (SCCHS), were analyzed using gas chromatography/mass spectrometry (GC/MS) techniques. Ninety-four organic compounds were quantified in these samples, including n-alkanes, fatty acids, polycyclic aromatic hydrocarbons (PAH), ho-panes, steranes, aromatic diacids, aliphatic diacids, resin acids, methoxyphenols, and levoglucosan. Annual average concentrations of all detected compounds, as well as average concentrations for three seasonal periods, were determined at all 12 sites for the calendar year of 1995. These measurements provide important information about the seasonal and spatial distribution of particle-phase organic compounds in southern California. Also, co-located

samples from one site were analyzed to assess precision of measurement. Excellent agreement was observed between annual average concentrations for the broad range of organic compounds measured in this study. Measured concentrations from the 12 sampling sites were used in a previously developed molecular-marker source apportionment model to quantify the primary source contributions to the PM_{10} organic carbon and mass concentrations at these 12 sites. Source contributions to atmospheric PM from six important air pollution sources were quantified: gasoline-powered motor vehicle exhaust, diesel vehicle exhaust, wood smoke, vegetative detritus, tire wear, and natural gas combustion. Important trends in the seasonal and spatial patterns of the impact of these six sources were observed. In addition, contributions from meat smoke were detected in selected samples.