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Secondary Organic Aerosol formation from the gas-phase ozonolysis of 3-methylcatechol and 4-methylcatechol

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Secondary Organic Aerosol (SOA) formation during the ozonolysis of 3-methylcatechol (3-methyl-1,2-dihydroxybenzene) and 4-methylcatechol (3-methyl-1,2-dihydroxybenzene) was investigated using a simulation chamber (8 m3) at atmospheric pressure, room temperature (294 $\pm$ 2 K) and low relative humidity (5-10%). The initial mixing ratios were as follows (in ppb): 3-methylcatechol (194-1059), 4-methylcatechol (204-1188) and ozone (93-531). The ozone and methylcatechol concentrations were followed by UV photometry and GC-FID (Gas Chromatography – Flame ionization detector), respectively and the aerosol production was monitored using a SMPS (Scanning Mobility Particle Sizer). The SOA yields (Y) were determined as the ratio of the suspended aerosol mass corrected for wall losses (Mo) to the total reacted methylcatechol concentrations assuming a particle density of 1.4 g cm-3. The aerosol formation yield increases as the initial methylcatechol concentration increases, and leads to aerosol yields ranging from 32% to 67% and from 30% to 64% for 3-methylcatechol and 4-methylcatechol, respectively. Y is a strong function of Mo and the organic aerosol formation can be expressed by a one-product gas/particle partitioning absorption model. These data are comparable to those published in a recent study on secondary organic aerosol formation from catechol ozonolysis. To our knowledge, this work represents the first investigation of SOA formation from the ozone reaction with methylcatechols.