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Rate coefficients for the gas-phase reaction of hydroxyl radicals with 2-methoxyphenol (Guaiacol) and related compounds

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2-Methoxyphenol (guaiacol) and its derivatives are potential marker compounds for wood smoke emissions in the atmosphere. To investigate the atmospheric reactivity of this type of compounds, rate coefficients for their reactions with hydroxyl (OH) radicals have been determined at 294 $\pm$ 2 K and 1 atm using the relative rate method with gas chromatography for chemical analysis. The rate coefficients (in units of cm^3 $molecule^{-1}$ s^{-1}) are: 2-methoxyphenol, (7.53 $\pm$ 0.41) $\times$ 10^{-11}; 3-methoxyphenol, (9.80 $\pm$ 0.46) $\times$ 10^{-11}; 4-methoxyphenol, (9.50 $\pm$ 0.55) $\times$ 10^{-11}; 2-methoxy-4-methylphenol, (9.45 $\pm$ 0.59) $\times$ 10^{-11}; methoxybenzene, (2.20 $\pm$ 0.15) $\times$ 10^{-11}. The estimated atmospheric lifetime for 2-methoxyphenol is around 2 hours, indicating that it is too reactive to be used as a tracer for wood smoke emissions. The reactivity of the methoxyphenols is compared to other substituted aromatics and interpreted in relation to the type, number and positions of the different substituents on the aromatic ring. The atmospheric implications of the reactions are also discussed.