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Pure component vapor pressures of organic isomers

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Atmospheric aerosols affect the Earth's climate directly through light scattering and absorption as well as indirectly by affecting cloud formation. There are many unanswered questions about how material properties of organic aerosols affect the climate. Predicting the formation of secondary organic aerosol (SOA), arising from gas to particle partitioning of potentially millions of compounds, remains one of the most challenging aspects in this regards. Of particular importance on predicting SOA formation is the saturation vapor pressure of each component. This property is typically obtained from group contribution methods (GCMs). However, it is currently unclear as to what level of accuracy is required or attainable from such techniques. Researchers have recently been able to measure low vapor pressures (lower limit of 10^{-8} Pa) experimentally using various techniques, and the University of Manchester Knudsen Effusion Mass Spectrometer (KEMS) has previously been used to measure vapor pressure of low volatility organics. Our recent KEMS work shows that functional group positioning has an effect on vapor pressure that is not accurately captured with estimation methods, and that experimental vapor pressures are 1-4 orders of magnitudes lower than predictive techniques. This has atmospheric impact through the variable amount of organic aerosol that is predicted to condense. In this study we present new measurements from the KEMS that can then be used to refine different experimental vapor pressure techniques as well as to provide data sets for building regression models to improve current predictive techniques.