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Atmos. Chem. Phys., 9, 973-980, 2009

www.atmos-chem-phys.net/9/973/2009/

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The Cloud Condensation Nuclei (CCN) properties of 2-methyltetrols and C3-C6 polyols from osmolality and surface tension measurements

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Abstract. A significant fraction of the organic material in aerosols is made of highly soluble compounds such as sugars (mono- and polysaccharides) and polyols such as the 2-methyltetrols, methylerythritol and methyltreitol. Because of their high solubility these compounds are considered as potentially efficient CCN material. For the 2-methyltetrols, this would have important implications for cloud formation at global scale because they are thought to be produced by the atmospheric oxidation of isoprene. To investigate this question, the complete Köhler curves for C3-C6 polyols and the 2-methyltetrols have been determined experimentally from osmolality and surface tension measurements. Contrary to what was expected, none of these compounds displayed a higher CCN efficiency than organic acids. Their Raoult terms show that this limited CCN efficiency is due to their absence of dissociation in water, this in spite of slight surface-tension effects for the 2-methyltetrols. Thus, compounds such as saccharides and polyols would not contribute more to cloud formation than other organic compounds studied so far. In particular, the presence of 2-methyltetrols in aerosols would not particularly enhance cloud formation in the atmosphere, in contrary to recently suggested.

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Citation: Ekström, S., Nozière, B., and Hansson, H.-C.: The Cloud Condensation Nuclei (CCN) properties of 2-methyltetrols and C3-C6 polyols from osmolality and surface tension measurements, Atmos. Chem. Phys., 9, 973-980, 2009. ▣ [Bibtex](#) ▣ [EndNote](#) ▣ [Reference Manager](#)

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