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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Solid state and sub-cooled liquid vapour pressures of substituted dicarboxylic acids using Knudsen Effusion Mass Spectrometry (KEMS) and Differential Scanning Calorimetry" *by* A. M. Booth et al.

Anonymous Referee #1

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General comment

This paper reports new measurements of solid state vapor pressures of substituted dicarboxylic acids using Knudsen Effusion Mass Spectrometry. Using these data together with DSC measurements, the authors derive sub-cooled liquid vapor pressures and compare the results with different estimation methods available on the E-AIM website. Several groups have measured vapor pressures of dicarboxylic acids. The range of measured values shows a considerable spread that is often larger than indicated error margins of measurements. One reason for this spread is that the phase state of the

substance under investigation is not controlled. This study now explicitly reports measured solid-state vapor pressures and gives estimates for the atmospherically more relevant sub-cooled liquid vapor pressures. This paper is well suited for ACP and can be published subject to minor revisions.

Specific comments

Tables and text: the authors should use correct IUPAC nomenclature for the substituents, e.g. "hydroxy" instead of "ol". They might also add the common names to Table 1.

Page 5719, lines 22-23: "at the triple point" should be deleted. Solidification can occur anywhere in a metastable region of a phase diagram.

Page 5720, line 16: it should be added that Tt stands for triple point.

Page 5723, Eq (9): This equation should be checked. It misses the first term compared with Myrdal's Eq (12).

Page 5726, lines 6-15: more information should be given on how the instrument was calibrated for temperature and heat flow.

Page 5728, lines 2-3: this sentence is inaccurate. Riipinen and Koponen measured vapor pressures in the humidity range 58-80% and derived values for the sub-cooled liquid state.

Page 5729, lines 12-21: the substances with the highest melting points and the highest enthalpies of fusion seem to have the highest sub-cooled liquid vapour pressures. It should be discussed whether this could be a systematic error of the conversion from solid-state to sub-cooled liquid vapour pressures: for high melting temperatures the range of extrapolation is largest and the temperature dependence of the enthalpy of fusion might be important. E.g. for water, the temperature dependence of the enthalpy of fusion is considerable (see Speedy, J. Phys. Chem., 1987, 91, 3354-3358, Table 4).

Page 5743, Table 5: the literature data is all from Riipinen et al., Table 5. The cited values cannot be found in Koponen et al.

Page 5745, Table 7: units should be indicated. For a better comparison it would be helpful if the range of the experimental data were added in an additional column.

Page 5748, Figure 3: this figure is not mentioned in the text. Units of vapor pressure are missing.

Page 5749, Figure 4: the meaning of the whiskers should be explicitly stated since it can vary between box-whisker plots.

Technical comments:

Page 5722, line 6: “Nannoolal” instead of “Nanoolal”

Page 5722, line19: bracket is missing before “1994”

Page 5725, line 2: “Balzers-Pfeiffer” instead of “Balzers-Pffeifer”

Page 5725, line 16: delete the “and” after “k”

Page 5727, line 9: “data” instead of “date”

Page 5727, line 10: “which” instead of “with”

Page 5727, line 12: delete the “by”

Page 5728, line 16: delete “HTDMA”

Page 5729, line 3: delete “observe”

Page 5729, line 6: “azelaic” instead of “azleaic”

Page 5731, line 3: “value” instead of “values”

Page 5734, line 19: delete “Raret”

Page 5735, lines 19-24: check references: “Ribeiro” instead of “Riberio”; check initials

of authors.

Page 5747, figure caption: diamond should be filled.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 5717, 2010.