

Interactive comment on “Optical properties in the UV and visible spectral region of organic acids relevant to tropospheric aerosols” by C. E. Lund Myhre and C. J. Nielsen

C. E. Lund Myhre and C. J. Nielsen

Received and published: 29 July 2004

Response to comments by Referee #1. 1. First, all the absorption bands of the organic acids in the NIR region are much weaker than the water bands. This is illustrated in Figure 4, in which one sees that the absorption index decreases as the acid concentration increases. Second, the line widths of the aqueous organic acid overtones and combination bands with sufficient intensity to be of interest involve the H-bonded carboxylic acid group. That is, they are very broad. For comparison, the width of the OH stretching band in aqueous Glutaric acid is several hundre wavenumbers.

2. It was not our intention to claim that the method using several cells with different lengths is new and revolutionary, and that we should receive special credit for inventing it. We have just tried to describe the experimental procedure such that other

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

researchers may reproduce or evaluate the results.

3. The point in Figure 7 that the Referee points to as being especially "off" the empirical relationship (4) corresponds to a 20.2 wt% methanesulphonic acid solution. The data for MSA solutions were included to show that the linear relationship derived for the aqueous organic acids actually works quite well for "quasi organic acids" like MSA as well - actually better than one might expect from the mere simplicity of the relation. The data points for MSA were not included in the derivation of the relationship.

The empirical relation (4), $n(632.8 \text{ nm})=632.8 = 1.3320 + 0.12w$, reproduces all the observations (for the organic acids) within 0.0005, which should be compared to the estimated uncertainty of 0.0002. That is the empirical relation reproduces the observation within 3 times the estimated standard deviation of the observations. We will include this information in the final version of the paper.

The Referee suggests that another independent variable like the mole fraction or volume fraction would be a better choice in the parameterisation. We have actually tried to use mole fraction as the independent variable. In this case the relationship is not linear. We have not considered to use the volume fraction as this parameter is temperature dependent.

The empirical relation (3), $n(\text{solution}) = 0.99824 + 0.708 x^{0.771}$, reproduces all the observations within 0.0013 g cm⁻³, which should be compared to the estimated uncertainty of 0.0004 g cm⁻³. That is the empirical relation reproduces the observation within 3 times the estimated standard deviation of the observations. We will include this information in the final version of the paper.

4. The water combination/overtone bands around 980 nm melts into one in the liquid phase. The OH stretching modes in liquid water melt into one, very broad band (around 400 wavenumbers).

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 3013, 2004.