Mixing experiment with the LS-VToF-AMS

Squalane + $d_{46}$-docosane

Monday, October 3, 2011
CE = 0.93  
(prompt / prompt+null)

But... Red / Blue = 0.42  
(good triggers / all triggers)

Lots of noise in the laser triggering

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How do you define when particles have enough signal?

But... Red / Blue = 0.42 (good triggers / all triggers)

Lots of noise in the laser triggering
Uncentered Correlation Coefficient (compared to pure \(d_{46}\)-docosane)

- **Total organics**
- **Squalane fragment**
- **\(d_{46}\)-docosane fragment**

**Light Scattering** \(D_{\text{va}}\) (nm)

Mass (ug/m\(^3\))

Temp. ramped from 22\(^\circ\)C to 44\(^\circ\)C
Uncentered Correlation Coefficient
(compared to pure $d_{46}$-docosane)

- Total organics
- Squalane fragment
- $d_{46}$-docosane fragment
- UC Coefficient

Light Scattering $D_{va}$ (nm)

Mass (ug/m$^3$)

Temp. ramped from 22C to 44C

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There definitely were some D46-only particles emitted, but the end of the experiment has very few D46-only looking particles.

$mz_{50} = C_{3}D_{7}^{+}$

$mz_{43} = C_{3}H_{7}^{+}$
There definitely were some D46-only particles emitted, but the end of the experiment has very few D46-only looking particles.
Strong contributions from fragments of both chemicals
In a perfect world the 43:57 ratio be the same for all of these particles (even the ones that are mixed with d46-docosane).

Efficient values ± one standard deviation:

a = 17.429 ± inf
b = 0.78422 ± inf

"squalane particle" (but no mz 43)

"squalane particle" (but no mz 57)
Still, these are highly correlated spectra (Pearson’s R)

(I haven’t done any true cluster analysis, but if I did they would probably be clustered together)

KEY:
When there are only a few unique fragments (unlike this system), this becomes tricky
Conclusions:

1. Single particle data helps assess mixing in this (simple) system

My Questions:

1. What variability do you expect between single particle MS of like organics (same size, same composition)?

2. Is this a normal amount of noise to see in my laser?

3. Has anyone done cluster analysis on single particle data from the AMS (if so, let me know :D)