What is My Vaporizer Temperature?

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Sept. 4, 2010

Vaporizer Temperature Power Curve for Several Systems

Vaporizer can handle 14W max. Vaporizer lifetime is good, failures are rare.
Inconsistent Temperature-Power relationship

Thermocouple “detachment” problem

Why do we operate at 600C?

IPP measurements for NH4NO3, (NH4)2SO4 and malonic acid

Peak in (NH4)2SO4, peak in organic and before NH4NO3 drops.
Use of NaNO3 to “calibrate” Vaporizer Temperature in pTOF mode

Approximately 750°C (4.5W) gives good PToF traces for NaNO3 (m/z 30).

Examine decay of NaNO3 pTOF traces

Fit falling edge of PToF with single exponential. Plot tau vs amps. PToF are narrow by 1.1 A, or 700 to 750 C. Vaporizer is glowing dull orange from back (front is cooler than back).
Summary

- Recommended operating temperature is ~600°C based on plateau in measured IPP for NH4NO3, (NH4)2SO4 and organics.
- If vaporizer temperature is not reading 600°C at 3.0-3.5W, you likely have a TC contact problem, it would be good to check with NaNO3.
- Record NaNO3 mz30 PToF at different power settings. Sharpens up at 700 to 750°C. Subtract 0.1 from amps to get operating current.
- Look at back of vaporizer. If glowing dull orange, 700 to 750°C. Too hot for normal operation.
- Also, check that T/C reading on front panel agrees with T/C reading in data acquisition program.
- Avoid cooking the vaporizer for extended periods.
- Once the TC reading goes bad, it is likely to only get worse, can be off by 100’s of degrees.
- A better TC-vaporizer design is needed.

Discussion

How do organic mass spectra vary with vaporizer temperature, 43/44 does it matter?
Malonic acid as function of vaporizer temperature.

No significant changes, looks more oxygenated at lower vaporizer T.

Succinic acid as a function of vaporizer T. No clear pattern.
Malonic acid, 4 different instruments.

Succinic acid, 4 different instruments.

Differences among instruments larger than differences vs vaporizer T.
Variability in “triangle” space

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Differences vs instrument larger than differences vs vaporizer T.

Extras: Fragmentation pattern has only organics and air. Org_28 = org_44

Air frags set for a filter period.
Succinic acid, ARI Q-AMS and PSI HR-ToF sampling from the same source, two different days, nominally same vaporizer T.