

# Evaluation and Minimization of Organic Aerosol Sampling Artifacts Using Impactors and Quartz Fiber Filter Denuders

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## BACKGROUND

When PM is collected on a fiber filter, POC may volatilize once collected, or gaseous components may adsorb to either the filtration medium or previously collected particulate matter and therefore become apparent POC. These processes, known as collection artifacts, therefore, may be positive or negative compared with the actual concentration found in the air at the time of collection.

## OBJECTIVE

Better characterize the magnitude of these collection artifact processes to assess the contribution and source of POC to PM<sub>2.5</sub>.

## APPROACH

- A denuder to remove gas phase interfering species and then sample with a medium capable of quantitatively capturing the particulate phase
- Simultaneously collect POC using nine sampling configurations and compare the results with the PM<sub>2.5</sub> Federal Reference Method to estimate sampling uncertainty due to collection artifacts
- Primary method uses three components (#5 to the right):
  - Quartz fiber denuder
  - Impactor
  - Quartz filter

## EXPERIMENTAL PLAN

CONFIGURATION	ANALYSIS	PARAMETER / FUNCTION
1. ____ Q	TOA	PM <sub>2.5</sub> POC
2. ____ T ____ Q	Mass TOA	Federal Method PM <sub>2.5</sub> reference Adsorbed VOC, VPOC
3. /Q/ ____ Q ____ Q	none TOA TOA	Removes VOC that adsorb on quartz filter POC w/o adsorbed gases Indicates /Q/ efficiency or adsorbed VPOC
4. ----- I ____ Q ____ Q	TOA TOA TOA	POC w/o adsorption or volatilization Very fine POC, adsorbed VOC, VPOC Adsorbed VOC
5. /Q/ ----- I ____ Q ____ Q	none TOA TOA TOA	Removes VOCs that adsorb on quartz filter POC w/o adsorption or volatilization? Very fine POC, adsorbed VPOC Adsorbed VOC
6. ----- I /Q/ ____ Q ____ Q	TOA none TOA TOA	POC w/o adsorption or volatilization Removes VPOC, VOC that adsorb on quartz filter Very fine POC Potentially very little OC
7. ____ T ----- I ____ Q	none TOA TOA	Removes POC Dynamic POC blank Adsorbed VOC, VPOC
8. /C/ ____ Q ____ Q ____ CIF	none TOA TOA TPV	Removes VOC POC, remaining VOC Adsorbed VPOC, remaining VOC Remaining VOC, VPOC
9. ____ T /C/ ____ Q ____ Q ____ CIF	none none TOA TOA TPV	Removes POC Removes VOC Absorbed remaining VOC+VPOC As above, measure of Q breakthrough Remaining VOC+VPOC

Q=quartz filter, T=Teflon filter, I=Impactor, /Q/=quartz fiber filter denuder, /C/=carbon denuder  
CIF=carbon impregnated filter, VOC=volatile organic carbon, POC=particulate organic carbon,  
VPOC=volatilized POC, TOA=thermal optical analysis, TPV=temperature programmed volatilization

## SCHEDULE

- Method Development - Spring 2004
- Sampling - Los Angeles & Riverside Summer 2004
- Analysis - Fall 2004
- Report - Early 2005