

TIPS TO PREVENT OR DELAY CAPILLARY CLOGGING

APPLICATION NOTE 3480-001

Capillaries

The Electro Spray Aerosol Generator (EAG) Model 3480 generates monodisperse aerosol particles by pushing a liquid sample through a capillary tube. An electrical field draws the liquid into a jet at the capillary tip.



Liquid sample spraying from the capillary tip

Over time, the capillary can become clogged due to build-up from particles or residue. There are actions that can be taken to prevent or delay capillary clogging and prolong the life of the capillary.

Signs of a Clogged or Clogging Capillary

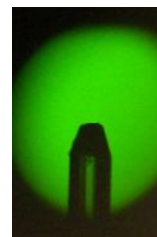
- No visible dripping from capillary tip at low voltage (< 1 kV)
- Low or decreasing current (< -200 nA)
- No current

During normal operation, the liquid flow is visible as a cone on the capillary tip. If no flow is visible at the tip, the capillary may be clogged.

The nominal current reading for a conductive sample is approximately -240 nA. If the current drops continuously during analysis, the capillary may be clogging. If the current drops to zero (no current), the capillary may be plugged.



Cone-jet indicates flow



No liquid flow

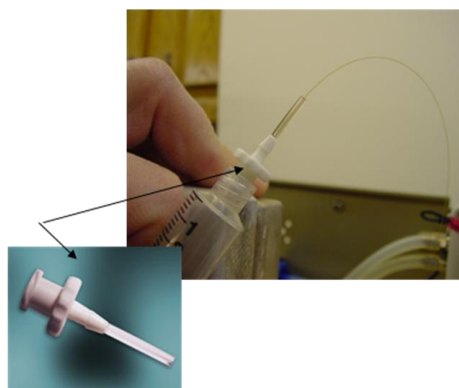


Tips to Prevent Capillary Clogging

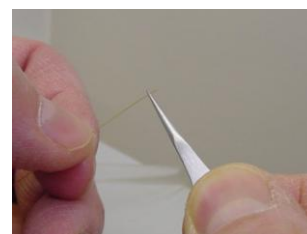
- Dilute the sample (*if possible*)
 - Lower particle concentrations can postpone clogging
- Clean the capillary between samples:
 - Run buffer (20 mM ammonium acetate) for several minutes
 - Run 5% acetic acid solution for ~5 minutes, followed by buffer
- Switch samples as quickly as possible
 - Release sample chamber, switch vials, and replace chamber, all within a few seconds. Reducing the amount of air that enters the capillary can suppress clogging
- Purge capillary after use
 - Run buffer for at least 10 minutes
 - Run dry air through the capillary (no vial) until there is no visible dripping from the tip

Unplugging a Clogged Capillary

- Blow air through the capillary
 - Turn the sample chamber pressure down
 - Remove the tip end of the capillary from the ionization chamber
 - Use a piece of soft tubing that fits over the $\frac{1}{16}$ -inch PEEK tubing, connected to a 5 or 10 cc plastic syringe, to apply pressure
 - Small bubbles should be observed in the vial at a rate of at least one every few seconds when pressure is applied to the syringe
- Break off the end of the capillary
 - If no bubbles form when air pressure is applied, break off 1 to 2 mm from the vial end of the capillary using forceps
- If the capillary remains clogged, it should be replaced



Luer-to-CE/Luer-to-GC Adapter can be ordered at InnovaQuartz Incorporated (www.innovaquartz.com)



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USA	Tel: +1 800 874 2811	India	Tel: +91 80 67877200
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France	Tel: +33 4 91 11 87 64	Singapore	Tel: +65 6595 6388
Germany	Tel: +49 241 523030		