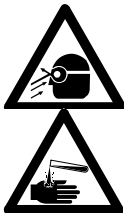
ICP-OES Organics Kit Installation Instructions

The ICP Organics Kit is an accessory for use with the Agilent ICP-OES instruments. It is available in two versions – one for axial ICP-OES and the other for radial ICP-OES. It is used to analyze directly (that is, without dilution) organic solvents with high vapor pressures at room temperature (for example, gasoline, naphtha).

WARNING



Eye and Corrosive Liquid Hazard

Solvents used with the cooled spray chamber (such as gasoline) may be highly flammable and can create fire hazards if improperly used. Always ensure that laboratory safety practices governing the use, handling and disposal of such material are strictly observed.

It is recommended that the Organics Kit is used with the AGM 1 Auxiliary Gas Module. The AGM 1 controls the flow of oxygen into the plasma. The oxygen prevents formation of carbon in the torch when using organic solvents and stabilizes the plasma when aspirating high vapor pressure organics for analysis by ICP-OES.

The cooled spray chamber comes in a kit with a demountable torch, tubing and attachments. The Organics Kit contains:

- Cooled spray chamber
- Demountable torch body
- Demountable torch injector tube holder
- Small bore (0.8 mm ID) injector tube (packet of 3)
- Peristaltic pump tubing organics, black (sample)
- Peristaltic pump tubing organics, grey (drain)
- Organics resistant transfer tubing (spray chamber to torch)
- *Nebulizer holder
- *O-ring (for nebulizer)
- *O-ring kit (for nebulizer holder)
- Capillary tubing (small)
- Drain tubing
- Mounting bracket

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- Hose clamps
- Instruction sheet
- * These items are assembled as one unit.

The cooled spray chamber requires, but does not include, a recirculating cooler capable of cooling to approximately -10 °C, and tubing to carry the coolant to the spray chamber. An appropriate cooler would have the following properties:

- Cooling capacity: Approximately 260 W
- Flow rate: 5 L/min (900 BTU/hr)
- Maximum pressure: 40 kPa (5 PSI)
- Hose length: Approximately 2 m
- Hose diameter: 10 mm (3.8 in. ID)
- Coolant: 1:1 ethylene glycol/water

Installation

If the instrument is running, switch off the plasma and allow the torch to cool. Disconnect and remove the torch, spray chamber, nebulizer and pump tubing. Then install the Organics Kit components as described below:

Demountable torch

To install the demountable torch:

1 Assemble the components of the demountable torch as depicted in Figure 1. (Refer to the demountable torch instruction sheet for details).

NOTE The injector tube tip should be positioned approximately 3 mm below the top of the intermediate tube.

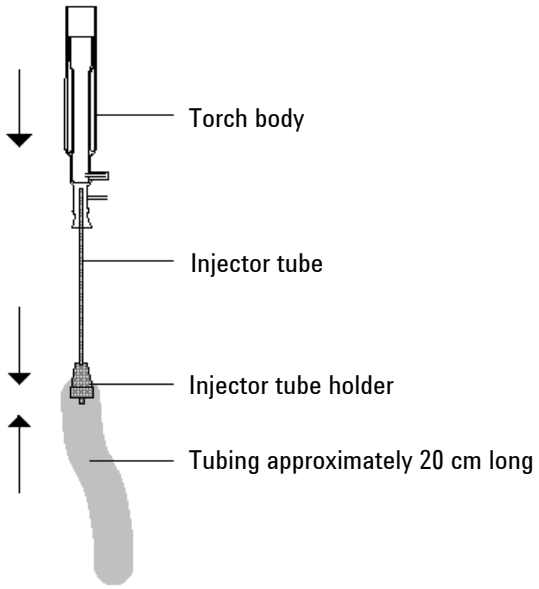

Figure 1. The demountable torch: the injector tube tip should be positioned approximately 3 mm below the top of the intermediate tube

2 Fit the plasma and auxiliary gas hoses to the torch (refer to the instrument operation manual for further instructions).

NOTE If you are using the AGM 1, attach the torch auxiliary gas hose to the brass end of the auxiliary gas adaptor (supplied with the AGM 1) which is fitted into the instrument's auxiliary gas outlet (refer to the instruction sheet supplied with AGM 1).

3 Fit 20 cm of organics-resistant tubing supplied to the end of the torch. This will later be connected to the top of the spray chamber.

4 Install the torch as per the instructions in the ICP-OES operation manual or the online Help.

Spray Chamber

Refer to Figure 2 when installing the spray chamber.

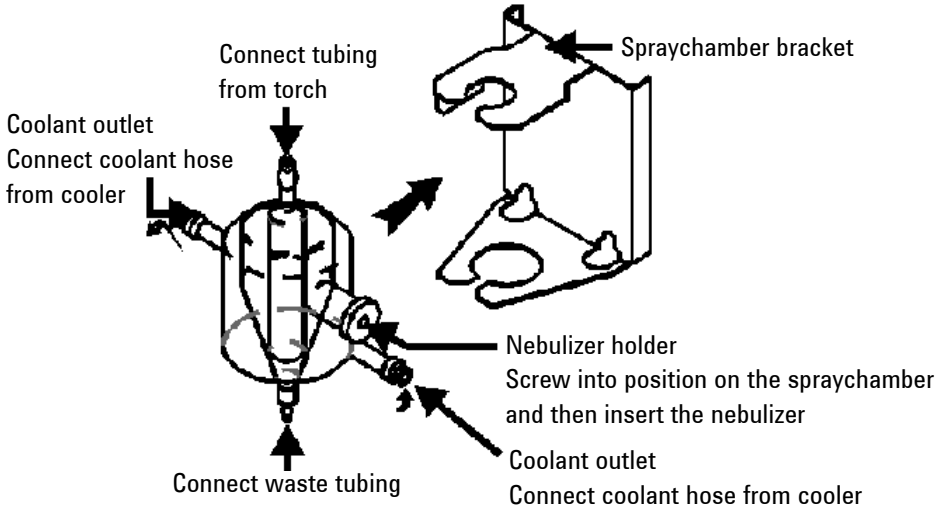

Figure 2. Spray chamber connections and bracket

To install the spray chamber:

1 Install the recirculating cooler as per the manufacturer's instructions. Connect the cooler hoses to the coolant inlet and outlet on the spray chamber (see Figure 2). Fit the hose clamps supplied.

WARNING

Eye and Corrosive Liquid Hazard
Ethylene glycol is highly corrosive and should be handled with care. Always wear appropriate safety clothing, gloves and eye protection when using ethylene glycol.

2 Screw the nebulizer holder into the spray chamber.

3 Clip the cooled spray chamber into the bracket.

TIP This can be facilitated by clicking the top stem of the cooled spray chamber into its mounting position and then gently pushing home the base of the cooled spray chamber.

If you are using an axial instrument follow the steps below, referring to Figure 3. For a radial instrument, continue straight to Step 4.

a Take the snap cap off position 2. Under the snap cap is a screw. Undo and remove the screw.

b Undo mounting lug 1 from position 1.

c Screw mounting lug 1 into position 2.

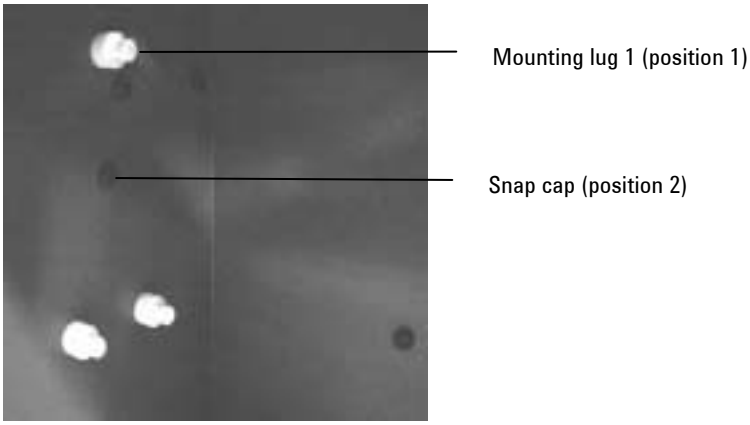

Figure 3. Sample compartment (left and rear walls shown)

4 Place the spray chamber and bracket in position in the sample compartment. The bracket should sit over the three plastic lugs in the sample compartment.

5 Fit the tubing attached to the bottom of the torch over the sample outlet at the top of the cooled spray chamber.

The drain tubing is attached to the outlet on the bottom of the spray chamber (refer to the 'Pump Tubing and Nebulizer' section below).

Pump Tubing and Nebulizer

A nebulizer is not provided with the Organics Kit. Use the 'K' style concentric glass nebulizer supplied as standard with the instrument.

1 Select one piece of drain (grey/grey) pump tubing. Attach a connector barb (1/16 in. ID to 1/8 in. ID tube) to each end of the pump tubing.

2 Cut a length (approximately 25 cm) of the drain tubing (1.57 mm ID x 3.17 mm OD) provided. Attach it over the barb fitted to one end of the drain pump tubing.

3 Cut a length of the drain tubing (1/8 in. ID x 3/16 in. OD) provided to reach between the peristaltic pump and your waste vessel. Attach it to the barb on the free end of the drain pump tubing.

4 Fit the drain pump tubing onto the peristaltic pump as described in the instrument operation manual and Help. Connect the shorter length of drain tubing to the bottom of the cooled spray chamber. Place the drain tubing into the drain vessel.

WARNING

Fire and Explosion Hazard

The drain vessel must be suitable for use with organic solvents, have a large opening and wide base, and be placed in full view of the operator. The drain vessel should be emptied frequently and wastes disposed of in accordance with local regulations.

5 Select one piece of sample (black/black) pump tubing.

6 Cut off the excess pieces of pump tubing (any piece of pump tubing extending over 1 cm past the tabs) to minimize dead volume.

7 Take a small piece of excess sample pump tubing (approximately 1–2 cm in length) and insert it carefully into the sample end of the nebulizer. Cut a piece of polyethylene tubing (0.04 ID x 1.09 OD, cut to fit between the nebulizer and the peristaltic pump) and insert this as far as it will go into the pump tubing attached to the nebulizer (see Figure 3).

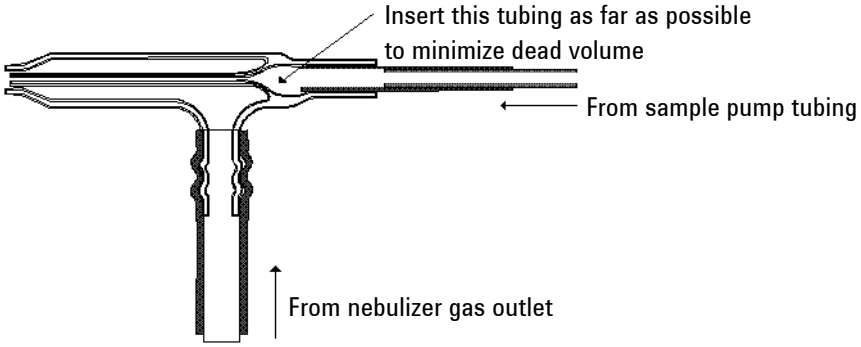

Figure 4. Nebulizer connections

8 Insert the nebulizer into the nebulizer holder on the spray chamber.

9 Fit the other end of the polyethylene tubing into the outlet end of the sample pump tubing.

10 To the other end of the sample pump tubing fit a length of capillary to reach the sample, or connect it to the autosampler (refer to the autosampler operation manual for further instructions).

NOTE The sample capillary provided is narrower than the nebulizer inlet tubing used on the autosampler. Use a small piece of the offcut sample pump tubing to join the autosampler tubing to the capillary tubing.

11 Connect the nebulizer gas hose (from the ‘Nebulizer’ gas outlet in the spectrometer sample introduction area) to the nebulizer gas inlet.

TIP Closely examine all tubing connections for bubble formation which may be indicative of air or solvent leaks. If bubbling is observed, refit the tubing connections until the bubbling ceases.

NOTE Do not use the ASA with the cooled spray chamber. Any water introduced into the spray chamber will ice up inside the spray chamber, if operated below 0 °C.

Operation

An example of the use of the cooled spray chamber is provided in the ICP-OES Application Note ICP-15 titled “Determination of Lead in Unleaded Gasoline by ICP-OES with the use of Oxygen and a Cooled Spray Chamber”. This is available free of charge from the Agilent website.

Other ICP-OES Application Notes that refer to the AGM for organic solvents include numbers ICP-20, 22 and 23.

For further information about Agilent and our products, contact your local Agilent representative.

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