

Introduction

The Carbon Cartridge is used to capture unretained hydrophilic semi-volatile organics from a sample that has passed through an SPE disk. Compounds with water solubility of 10g/L or higher will typically not be retained by conventional reverse phase mechanisms. The carbon cartridge has been applied to EPA methods 8270 and 625 and is typically used in combination with the Atlantic® One Pass Disk (PN 47-2346-11) but can be used with other SPE disks depending on the analytical needs of the application. Examples of compounds captured by the Carbon Cartridge include n-nitrosodimethylamine (NDMA), N-Nitroso-pyrrolidine, and methyl methanesulfonate.

There are two types of carbon cartridges available.

- **Carbon Cartridge PN 49-2620**
Used for hydrophilic semi-volatile organics and short-chain perfluorinated compounds (PFCs).
- **Carbon Cartridge Max-Detect PN 49-2620-01**
Providing ultimate cleanliness for better detection limits (not recommended for short-chain PFC determination).

Preparation and Notes

Install the One Pass Carbon Cartridge Kit for all the stations on the SPE-DEX® 5000 as per the instructions found in the installation guide document PN 29-2619-02.

- Configure the 5000 with the solvents required for the method. Typically solvents such as acetone and methylene chloride have been used with the carbon cartridge.
- Load the 5000 method for the disk and carbon cartridge.
 - The method typically includes a pause with message after the disk has completed the elution steps. The message displayed in the pause step prompts the user to swap the disk with the carbon cartridge and proceed with the final elution of the sample by clicking "Continue".
- Install the SPE Disk onto the Disk Platform.
- Install the sample bottle on the Water-in-Valve (WIV) and load WIV assembly onto the station.
- (NOTE) If using the Atlantic One Pass disk there are two disk elutions before the carbon cartridge elution.
 - The first disk elution for neutral and acidic compounds is collected in a 250 mL flat bottom round flask (from the kit).
 - The second disk elution for the basic compounds is collected in a separate 125 mL Erlenmeyer flask (from the kit). This second elution is not combined with the first elution as the alkaline pH of the eluate would back extract the acid analytes into the residual water phase of the extract.
 - The last elution with the carbon cartridge is collected and combined with the first elution flask. This reduces the number of flasks to clean and handle.
 - The eluate fractions are recombined during the DryDisk® drying steps into one complete extract that is evaporated down to a 1 mL endpoint.

Installing and Running the Carbon Cartridge

1. Press the Carbon Cartridge Cap into the top of a Carbon Cartridge. (Fig 1).



Figure 1

2. Insert the Carbon Cartridge Assembly into the Cartridge Holder and connect the Luer feed and a waste lines. (Fig. 2).



Figure 2

3. Install the appropriate size 19/22 flask as per the method and connect a blue Keck clamp on the flask to lock it in place. (Fig. 3). *Note: Flask shown is for illustration purposes.*

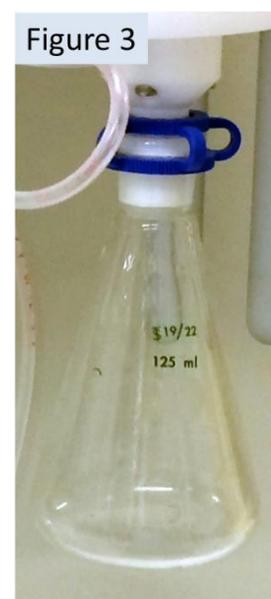
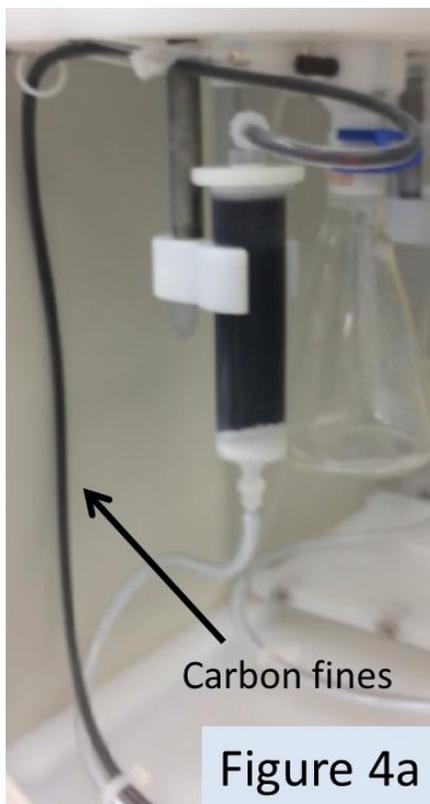


Figure 3

4. Run the method from the 5000 control software.

5. Solvent conditioning steps will be for the disk only. Solvent from the disk is directly sent to waste by-passing the carbon cartridge. The carbon cartridge is dry when the sample is passed through it.

6. As the sample flows through the cartridge from bottom to top, there will be a brief release of carbon fines sent out to aqueous waste (Fig 4a). This is normal and typically the lines clear within 25 seconds. (Fig 4b).



Carbon fines

Figure 4a

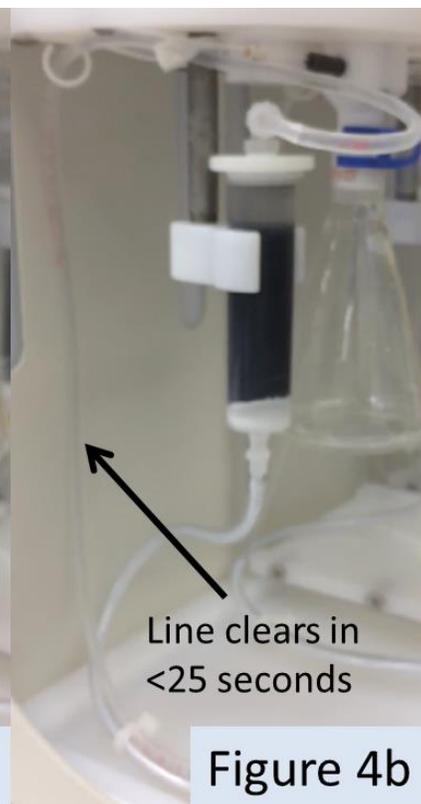

 Line clears in
<25 seconds

Figure 4b

7. When the disk elution is completed, the carbon cartridge requires preparation

for elution on the disk platform. Disconnect the tubing lines from the carbon cartridge but keep the cartridge cap adapter on for step 8. Reconnecting the cartridge line is not necessary for elution but it keeps the lines tidy. **Note:** *If the carbon cartridge is not being used in the next run, the lines must be connected to prevent spent sample waste collecting in the spill tray!*

8. The carbon bed needs to be resealed before elution. Locate the 20 cc syringe with plunger included with the Carbon Cartridge Kit. Pull the plunger back to the 20 cc mark then connected to the cap adapter. Place the outlet of the cartridge over a flask to collect any residual sample water. Quickly push air through the cartridge to reseat the carbon bed against the bottom frit of the cartridge (Fig 5). Repeat procedure again if the carbon bed is still not properly seated. An example of before and after is shown in Fig 6.
9. Replace Cap Adapter with Carbon Cartridge Funnel and place the assembly where the disk holder was positioned. (Fig 7).
10. Initiate carbon cartridge elution by clicking "Continue" on the control software.
11. When elution is complete, take the carbon extract (and any additional extract fractions from the sample) for drying using a DryDisk or DryDisk-R separation membrane. Follow procedures indicated by the method being if extract fractions are being recombined.



Figure 5

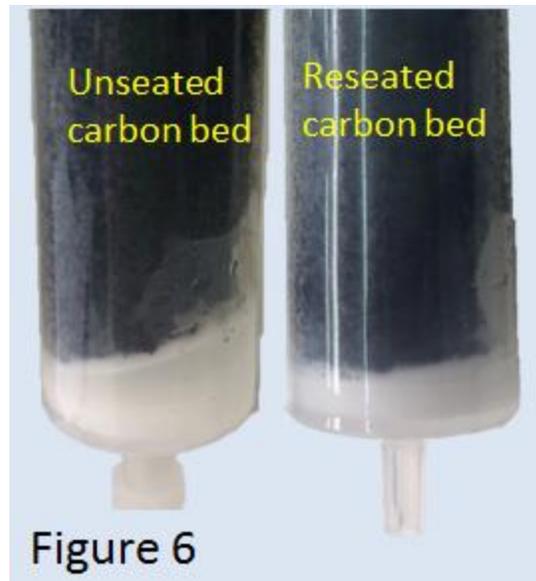


Figure 6

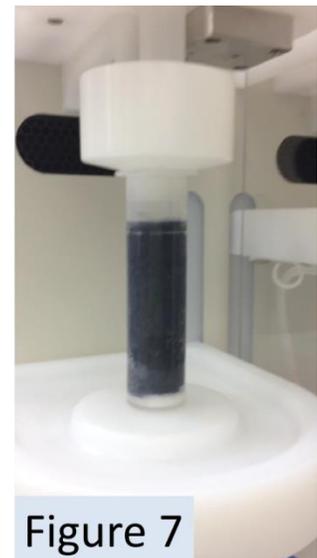


Figure 7