

ENVIRONMENTAL EXPRESS

Directions for the Environmental Express StepSaver

(U.S. Patent # 5,529,694)

Standard StepSaver Complete Systems

G1101	1-place Standard, PVC Manifold
G2101	1-place Standard, SS Manifold
G1103	3-place Standard, PVC Manifold
G2103	3-place Standard, SS Manifold
G1107	7-place Standard, PVC Manifold
G2106	6-place Standard, SS Manifold

UltraFlow StepSaver Complete Systems

G1121	1-place UltraFlow, PVC Manifold
G2121	1-place UltraFlow, SS Manifold
G1123	3-place UltraFlow, PVC Manifold
G2123	3-place UltraFlow, SS Manifold
G1127	7-place UltraFlow, PVC Manifold
G2126	6-place UltraFlow, SS Manifold

Single place 47mm and 90mm systems without manifolds are also available.

Unpacking and Assembly

Carefully remove the StepSaver from the packaging material and examine for breakage. Do not discard any packing material until you are confident that there has been no breakage of the glass. Please report any breakage to the carrier immediately.

Depending on your purchase, your StepSaver or StepSaver kit will come with all or some of the following. Check the website or call customer service to verify.

- #G1017 or G1018 1000mL Filter Funnel Reservoir (Standard Systems only, 47mm or 90mm)
- #G1020 or G1022 StepSaver extraction head (47mm or 90mm)
- #G1025 Teflon Stopcock with washer, o-ring, and nut
- #G1030 Stainless Steel support screen (G1020 extraction heads only – 47mm)
- #G1045 100mL collection flask with 24/25 joint (2 for every manifold place)
- #G1050 Keck clip for 24/25 joint
- #G1065 5.5g anhydrous sodium sulfate drying cartridges
- #G3030 or G3090 Silicone Sealing Gasket (47mm or 90mm)
- #G1055 or G1057 Anodized aluminum clamp (47mm or 90mm)
- #G5127 UltraFlow filter funnel assembly, pack of 20 (UltraFlow Systems only)
- #GUPF47EES UltraPrep filter funnel assembly, pack of 20 (UltraPrep Systems only)
- #G3070 20L HDPE trap with tubing and connections
- #G5047MM or G5090MM UltraFlow disks—20 or 15 pack (Standard Systems only, 47mm or 90mm)
- #GUP047MM or GUP090MM UltraPrep disks – 20 or 15 pack (Standard Systems only, 47mm or 90mm)
- #G3023 7mg HEM Snip & Pour MDL standard
- #G3025 40mg HEM Snip & Pour LCS standard
- #G1001 *Solid Phase Extraction Made Easy* video

Place the extraction head on the manifold with the 40/35 joint. Make sure that the manifold is at room temperature to reduce the possibility of the glassware sticking to the manifold. Insert the G1025 stopcock into the glass barrel; assemble the o-ring, the washer, then the threaded nut. Note that the handles of the stopcock plug align with the direction of the flow. **Be careful not to over tighten the nut.** In the “closed” position the arms of the stopcock will form a “V” shape.

If using the 47mm diameter, Standard StepSaver system, place the orange sealing gasket (G3030) on top of the flange of the extraction head, “cup” side up. Place the stainless steel support screen (G1030) in the “cup” of the orange sealing gasket. The extraction disk (G5047MM / GUP047MM) will rest on top of the support screen in the “cup”, pre-filter side up.

The 90mm diameter Standard StepSaver will not have a stainless steel support screen—only an orange sealing gasket (G3090). Place the orange sealing gasket on the top flange of the StepSaver. Orient the gasket so that the “cup” side faces up. The extraction disk (G5090MM / GUP090MM) will rest in the “cup”, pre-filter side up.

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If using the UltraFlow StepSaver system, place the orange sealing gasket (G3030) up into the bottom of the UltraFlow or UltraPrep funnel (G5127 / GUPF47EES).

Clamp the funnel onto the head with the aluminum clamp (G1055 or G1057). Care should be taken when clamping that the “fingers” of the clamp only touch the funnel. Do not let the very rear portion of the clamp attach to the funnel as leakage could occur.

Attach the manifold to the water trap (G3070) and then to a vacuum source. The vacuum source should be able to provide 25” of Hg with good air flow. Good flow rate is essential to properly perform the extraction.

Slip the sodium sulfate drying cartridge (G1065) onto the collection side of the extraction head. Place the pre-weighed collection flask (G1045) over the drying cartridge and attach to the extraction head using a Keck clip (G1050).

When the vacuum valve on the manifold is in the “closed” position (arms 3 to 9 o’clock), insure that the guide pin (small silver circle on the face of the valve) is on top.

Cleaning

For oil and grease applications, only the funnel needs to be cleaned with soap and water after use. The stopcock and the head of the StepSaver may be cleaned by rinsing with hexane. In this fashion, the assembly of the StepSaver may always remain on the filter manifold.

WARRANTY

THE FOLLOWING IS MADE IN LIEU OF ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OR MERCHANTABILITY FOR A PARTICULAR PURPOSE. The seller’s and the manufacturer’s only obligation will be to replace the quantity of the product proven to be defective. Environmental Express will not be liable for any injury, loss, or damage direct or consequential arising out of the use of this product. Before using, the user must determine the suitability of the product for his or her intended use.

EPA Method 1664 Procedure using the Environmental Express StepSaver

Apparatus and Supplies

1. 47mm or 90mm StepSaver glass with filtration manifold, water trap, and vacuum source
2. Extraction disks such as the UltraFlow or UltraPrep disks
3. Dried and weighed receiving flasks with 24/25 ground glass joint
4. 5.5 gram sodium sulfate drying cartridge
5. Teflon Dispensing squirt bottles
6. Analytical balance
7. Dessicator
8. QuikVap (G7000) or other evaporative device

Reagents

1. n-Hexane, 85% purity or greater (LCCC08005)
2. Methanol (LC168004)
3. Hexadecane, stearic acid standard (G3025)
4. Deionized water (LC267504)
5. Hydrochloric Acid (LC149503)
6. Sulfuric Acid (LC255503)

Sample Preparation

1. Adjust sample pH to ≤ 2.0 with HCl or H₂SO₄. If there are solids in the sample, check the pH again immediately before extraction to ensure that the pH has not changed.
2. If sample is high in suspended solids, allow solids to settle. Tilting sample container to allow solids to settle in a corner of the container is helpful in decanting liquid portion of the sample.

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UltraFlow Extraction Disk Conditioning and Sample Filtration

WARNING!!! ENSURE THAT YOU HAVE THE CORRECT EXTRACTION DISK! USING THE ULTRAFLOW DISK REQUIRES CONDITIONING WITH METHANOL WHILE THE ULTRAPREP DISK DOES NOT. FAILURE TO CONDITION A ULTRAFLOW DISK CAN LEAD TO FAILURE OF THE SPE PROCESS AND POTENTIAL LOSS OF SAMPLE!!

1. Assemble the StepSaver system as described above.
2. Ensure that the 2-way stopcock in the StepSaver assembly is on the “closed” position.
3. Position the vacuum valve on the manifold to the on position (6 to 12 o’clock). Wash the disk and walls of the funnel with 10-15 ml of n-hexane. Quickly turn the stopcock in the StepSaver toward the collection flask and then back to the “closed” position. This should draw a small amount of hexane through the disk. Allow the disk to soak for two minutes. Turn the stopcock toward the collection flask and pull the remaining hexane through disk into the collection flask. Allow the disk to vacuum dry for one to two minutes, making sure all hexane is removed from the disk.
4. Repeat above Hexane rinse steps if necessary.
5. Turn the StepSaver stopcock to the “closed” position. If using the UltraPrep disk proceed directly to the filtration portion of step 9.
6. Add 10-15 ml of methanol to the reservoir. Allow the methanol to soak for one minute.
7. Turn the StepSaver stopcock toward the waste side and allow the methanol to filter through the extraction disk. **DO NOT COLLECT ANY METHANOL INTO THE COLLECTION FLASK! THIS COULD POTENTIALLY CHANGE THE CHEMISTRY OF THE ANALYSIS AND VOID YOUR RESULTS!**
8. As the methanol is filtering through the extraction disk, add DI Water to the reservoir. **IT IS IMPORTANT TO NOT LET THE EXTRACTION DISK GO DRY!**
9. Ensure that all of the methanol has filtered through the extraction disk and has been replaced with DI Water. **DO NOT ALLOW THE SAMPLE TO COME INTO DIRECT CONTACT WITH THE METHANOL.** Now filter the sample through the extraction disk.
10. Set the empty sample container on its edge so that the remaining water (1 to 3 mls) can collect, then add this remaining water to the reservoir before the extraction is complete.
11. After sample filtration is complete, continue to vacuum to air dry the filter for 5-20minutes--the longer the better.

UltraPrep Extraction Disk Prep and Sample Filtration

1. Assemble the StepSaver system as described above.
2. Insure that the 2-way stopcock in the StepSaver assembly is on the “closed” position.
3. Position the vacuum valve on the manifold to the on position (6 to 12 o’clock). Wash the disk and walls of the funnel with 10-15 ml of n-hexane. Quickly turn the stopcock in the StepSaver toward the collection flask and then back to the “closed” position. This should draw a small amount of hexane through the disk. Allow the disk to soak for two minutes. Turn the stopcock toward the collection flask and pull the remaining hexane through disk into the collection flask. Allow the disk to vacuum dry for one to two minutes, making sure all hexane is removed from the disk.
4. Repeat above hexane rinse steps if necessary.
5. Filter the sample through the extraction disk.
6. Set the empty sample container on its edge so that the remaining water (1 to 3 mls) can collect, then add this remaining water to the reservoir before the extraction is complete.
7. After sample filtration is complete, continue to vacuum to air dry the filter for 5-20minutes--the longer the better.

Sample Elution

1. Position the StepSaver stopcock to the “closed” position.
2. Add 10-15ml of n-hexane to the sample container, rinsing down the sides. Shake the hexane around the sample container, venting the cap occasionally. Pour the n-hexane from the sample container into the funnel.
3. Allow the hexane to soak the filter for two minutes.
4. Carefully turn the StepSaver stopcock toward the collection flask to slowly pull hexane through the extraction disk, through the sodium sulfate drying cartridge, and into the pre-weighed collection flask. It is important to pass the n-hexane through the drying cartridge slowly to allow adequate contact time for water absorption.
5. After all hexane has passed into the collection flask, turn the StepSaver stopcock to the “closed” position.

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Rinse down the sides of the funnel with 10 to 25 mls of n-Hexane. Be sure to rinse with Hexane until all oil and grease is removed from the sides of the glass funnel. **Note:** Stearic acid sticks to glassware! Be sure to rinse the funnel walls with hexane until all stearic acid crystals dissolve. Failure to thoroughly rinse Stearic acid from the glassware will result in low recoveries.

6. Carefully turn the StepSaver stopcock toward the collection flask to slowly pull the hexane through the extraction disk, through the sodium sulfate drying cartridge, and into the pre-weighed collection flask.
7. Remove the pre-weighed collection flask and evaporate the n-hexane at a temperature of 60-70°C. Do not boil. Do not evaporate to absolute dryness. Sweep the flask with a vacuum tube to evaporate via air flow the final drops of n-hexane and fumes.
8. Desiccate to room temperature.
9. Reweigh the flask to obtain the final weight.
Note: Hexadecane will volatilize if the n-Hexane boils. Further, Hexadecane begins to volatilize soon after the weighing flask becomes dry. Be sure to weigh the flask within an hour or two of placing it into the dessicator. Do not store the flask in the desiccator overnight. Reducing volatilization of hexadecane will improve recoveries.

TPH Extraction

1. Complete the O/G extraction and concentration procedures above.
2. Determine the amount of Silica gel required.
3. Add 15 mls of hexane and silica gel to the dried weigh flask. Swirl silica gel for appropriate amount of time.
4. Pour the hexane and silica gel over appropriate filter paper into a preweighed container.
5. Rinse the initial weigh flask with 5 to 10mls of hexane, and pour over same filter paper into preweighed container.
6. Evaporate and weigh the container to determine the amount of extractable TPH.