# Chemical Fact File®

# Elemental Mercury — OSHA ID-140

*This method provides adequate sensitivity (qualitative detection limit 0.01 µg* and quantitative detection limit 0.02 µg*) for measuring workplace atmospheric concentrations of elemental mercury. It offers the choice of collecting samples passively on a lightweight, economical dosimeter or actively on a sorbent tube. The passive dosimeter and sorbent tube each collect mercury vapor only. The sorbent tube may be used with a prefilter to collect both vapor and particulate mercury and can be used to determine compliance with the OSHA PEL of 0.1 mg/m³ (TWA) as total mercury (vapor + particulate).*

## *Required Equipment:*

### Active Method

1. An **Air Sampling Pump** capable of sampling at the recommended flow rate with the sampling medium in line, such as:
   - SKC 210 Series Pocket Pump® Sampler with Tube Holder 222-3-1
   - SKC AirChek® 2000 Sampler with Constant Pressure Controller Cat. No. 224-26-CPC, Low Flow Holder Cat. No. 224-26-01, and Protective Cover Cat. No. 224-29A
   - SKC AirChek 52 Sampler with Constant Pressure Controller Cat. No. 224-26-CPC, Low Flow Holder Cat. No. 224-26-01, and Protective Cover Cat. No. 224-29A
   - SKC Universal XR Series Sampler with Low Flow Holder Cat. No. 224-26-01 and Protective Tube Cover 224-29A
2. An **Airflow Calibrator**, such as:
   - SKC UltraFlo® Calibrator Cat. No. 709
   - DryCal® DC-Lite Flowmeter Cat. No. 717-01
3. SKC **Sorbent Tube** Cat. No. 226-17-1A†

### Passive Method

1. SKC **Passive Sampler Sorbent Capsules** Cat. No. 520-02A
2. SKC **Reusable Capsule Holder** Cat. No. 520-03

## *Optional Equipment:*

1. SKC **Tube Breaker** Cat. No. 222-3-50
2. SKC **Preloaded Filter Cassette** Cat. No. 225-3-01 (used in the active method as a prefilter to capture particulate mercury)
3. SKC **Collar Clip and Cable Tie** Cat. No. 225-13-6 (for use with sorbent tube-prefilter assembly)

## *SKC Application Guides:*

1. Sampling Train - Sorbent Sample Tubes, #1168
2. Calibrating a Pump Using a Film Flowmeter, #1163
3. Calibrating a Pump Using an Electronic Calibrator, #1366
4. Prefilter and Sorbent Tube Sampling, #1164

| Parameter | *Active Method* TWA* | *Passive Method* TWA* |
|---|---|---|
| **Flow Rate** | 200 ml/min | 20 ml/min |
| **Sample Time** | 8 hrs | 8 hrs |
| **Air Volume** | 100 L | 10 L |
| **OSHA PEL** | 0.1 mg/m³ | 0.1 mg/m³ |

(*Per 09/03/1996 OSHA Letter of Interpretation re: Standard 1910.1000 Table Z-2)

## *Sampling and Analysis:*

### Active Sampling

1. To set up a sorbent tube sampling train, break open both ends of a sorbent tube using the optional SKC sorbent tube breaker. Insert the sorbent tube into the rubber sleeve of the adjustable low flow holder or tube holder. The arrow on the sorbent tube indicates airflow and should point toward the tube holder and the pump. In the absence of an arrow, insert the end of the tube with the smallest sorbent section (backup section) into the tube holder. Connect the loose end of the flexible tubing to the inlet of a Constant Pressure Controller (CPC) if required by the pump for low flow sampling. Use tubing to connect the outlet of the tube or CPC to the pump inlet. *Request SKC Application Guide #1168 for more information on preparing sorbent tube sampling trains.*

***Prefilter Option:*** The prefilter should be added to the sampling train in the following situations:

a. Sampling in workplaces that contain both chlorine and mercury.
b. Sampling to determine compliance to the OSHA PEL for total mercury
c. Sampling in an atmosphere where particulate mercury compounds may present a problem.
d. When the sorbent in the sorbent tube has migrated into the tube's glass wool plug prior to sampling

To set up a sorbent tube sampling train with prefilter, insert the opened sorbent tube into the adjustable low flow holder as directed above. Remove the plugs from a loaded filter cassette. Use a short length of Teflon® tubing to connect the inlet of the sorbent tube to the outlet of the filter cassette. Use a representative filter cassette during calibration. The recommended flow rate remains at 200 ml/min with the prefilter-sorbent tube assembly. *Request SKC Application Guide #1164 for more information on preparing a prefilter and sorbent tube sampling train.*

* *Detection limits can vary depending on the background of the sorbent.*

† *SKC proprietary sorbent; performance comparable to Hydrar® and Hopcalite.*

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**SKC Inc.** 724-941-9701 **SKC South** 434-352-7149 **SKC Gulf Coast** 281-859-8050 **SKC West** 714-992-2780
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2. For calibrating the pump, use the sampling train described above except connect the sorbent tube inlet to the calibrator with a piece of flexible tubing. When using a prefilter, connect the inlet of the filter cassette to the calibrator. Use representative media. Calibrate the pump flow rate to the rate specified in the method. When calibration has been completed, remove representative media, cap it with the end caps provided, and save it for recalibration at the end of sampling. *Request SKC Application Guide #1366 or #1163 for more information on calibrating a pump.*

3. For sampling, set up a sampling train as above except use a new sorbent tube and do not break off the ends of the sorbent tube until ready to sample. The larger section of sorbent should be positioned away from the pump. Place the protective cover over the sorbent tube. Attach the clip on the protective cover to a worker's clothing near the breathing zone and the pump to the worker's belt. The sorbent tube should remain in a vertical position during sampling. Turn on the pump.

If using a prefilter, use Teflon tubing to attach a new filter cassette to the inlet of the sorbent tube. Do not unplug the cassette inlet until ready to sample. Loop the cassette through a cable tie and use the collar clip to attach the cassette to the worker's clothing in the breathing zone. Turn on the pump.

4. Sample at the recommended flow rate for the recommended period of time.

5. At the end of the sampling period, turn off the pump and note the ending time. Remove the media, seal it with the end caps provided, and record pertinent sampling information.

6. Verify pump flow rate with the representative sampling media in line to confirm that the flow rate has not changed by more than 5%.

### Passive Sampling

1. Remove the back cover with a screwdriver or coin.

2. Remove the sorbent capsule from the pouch, and place it in the sampler housing with the mesh side facing toward the front of the sampler (area with diffusion holes). Keep the pouch in a safe place free from mercury contamination.

3. Place a clean foam disk in the back cover. Fit the back cover into the sampler housing.

4. Record name, date, and start time on the label included with the replacement sorbent capsules, and place it on the back of the sampler. Note other pertinent sampling information.

5. Using the clip, attach sampler to worker's clothing near breathing zone.

6. To begin sampling, remove the front sealing cap. Retain the cap in a safe place that is free from contamination. The recommended sampling time is four to eight hours.

7. When sampling is complete, replace the sealing cap and record the finish time on the label. Note other pertinent sampling information.

## *Submitting Samples:*

1. Submit several field blanks from the same lot number as the media used as this sorbent does have a mercury background. Field blanks should be subjected to exactly the same handling as the samples (open, seal, and transport) except that no air is drawn through them.

2. Pack samples (tubes and cassettes sealed with caps and passive sorbent capsules in pouch), used passive dosimeter housings, field blanks, and all pertinent sampling information securely for shipment to a laboratory for analysis.

## *Storage:*

***Sorbent Tubes:*** Sorbent should be analyzed within 30 days of sampling.

***Passive Samplers:*** Sorbent should be analyzed within 30 days of sampling. Do not store sorbent capsules or capsule holders in contaminated areas.

## *Analyzing Method:*

Cold vapor-atomic absorption spectrophotometry (AAS)

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