



Chemical Fact File®

Formaldehyde — NIOSH 2016

NIOSH Method 2016 can be used for the determination of formaldehyde for both STEL and TWA exposures. The working range was determined to be 0.012 to 2 ppm for a 15-liter air sample. However, when using SKC Sorbent Tube Cat. No. 226-119 (method Appendix B), the maximum recommended air volume should be less than 15 liters at a concentration of 2.5 mg/m³. The presence of ozone can cause degradation of the formaldehyde derivative. Ketones and other aldehydes can also react with the DNPH reagent; however, these derivatives are separated chromatographically from the formaldehyde derivative.

Required Equipment:

1. An **air sampling pump** capable of sampling at the recommended flow rate with the sampling medium in line, such as:
 - SKC **Universal Sampler** with Low Flow Holder Cat. No. 224-26-01 and Protective Cover Cat. No. 224-29B
 - 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. 224-29B
 - SKC **AirChek XR5000 Series Sampler** with Constant Pressure Controller Cat. No. 224-26-CPC, Low Flow Holder Cat. No. 224-26-01, and Protective Cover Cat. No. 224-29B
 - 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. 224-29B
2. An **airflow calibrator**, such as:
 - **Defender Primary Standard Calibrator** Cat. No. 717 Series
3. SKC **Sorbent Tube** Cat. No. 226-119

Optional Equipment:

1. SKC **Tube Breaker** Cat. No. 222-3-50

SKC Application Guides:

1. Sampling Train — Single Sorbent Sample Tube, #1168
2. Calibrating a Pump Using an Electronic Calibrator, #1366

	TWA	Ceiling
Flow Rate	30 to 500 ml/min	30 to 500 ml/min
Sample Time	Varies	Varies
Air Volume	1 to < 15 L at 2.5 mg/m ³	1 to < 15 L at 0.25 mg/m ³
NIOSH REL <small>(NIOSH Manual of Analytical Methods [NMAM], Fourth Edition, 8/15/94)</small>	0.016 ppm	0.1 ppm

Sampling and Analysis:

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 air flow and should point toward the tube holder and 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 pump inlet. *Request SKC Application Guide #1168 for more information on preparing sorbent tube sampling trains.*
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. Calibrate the pump flow rate to the rate specified in the method. When calibration has been completed, remove the sorbent tube, cap it with the end caps provided, and save it for recalibration at the end of sampling. *Request SKC Application Guide #1366 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 until ready to sample. The larger section of sorbent should be facing 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.
4. Sample at an accurately known 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 sorbent tube, seal the ends of the tube with the end caps provided, and record any pertinent sampling information.
6. Calibrate the pump with the representative sampling media in line to verify that the flow has not changed by more than 5%.
7. Submit field blanks from the same lot number as the sample tubes. 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.
8. Pack sample sorbent tubes, field blanks, and all pertinent information securely for shipment to a laboratory for analysis.

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Storage:

Unexposed media should be stored in a freezer before use. Samples should be stored in a refrigerator and shipped to a laboratory as soon as possible.

Analyzing Method:

High-performance liquid chromatography - ultraviolet detector
(HPLC-UV) - modified recovery procedure

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