



Chemical Fact File®

4,4' Methylene bisphenyl isocyanate (MDI) — NIOSH 5521

NIOSH Method 5521 uses impingers to sample monomeric isocyanates in air. This method determines the air concentration of five specific isocyanates: toluene-2,4 diisocyanate (2,4-TDI), toluene-2,6 diisocyanate (2,6-TDI), 4-4'-methylene bisphenyl isocyanate (MDI), hexamethylene diisocyanate (HDI), and naphthylene diisocyanate (NDI).

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**
 - SKC **AirChek® 2000 Sampler**
 - SKC **AirChek XR5000 Series Sampler**
 - SKC **AirChek 52 Sampler**
2. An **air flow calibrator**, such as:
 - Defender Primary Standard Calibrator Cat. No. 717 Series
3. SKC **Impinger** Cat. No. 225-36-1
4. SKC **Impinger Trap** Cat. No. 225-22
5. **Collection Liquid Solution** of 15 ml 1-(2-methoxyphenyl)-piperazine in toluene

Optional Equipment:

1. SKC **Trap Sorbent** Cat. No. 225-22-02
2. SKC **Impinger Holder** Cat. No. 225-20-02 for area sampling
3. SKC **Holster** Cat. No. 225-20 and **Impinger Holder** Cat. No. 225-20-01 for personal sampling

SKC Application Guides:

1. Sampling Train — Impingers, #1165
2. Calibrating a Pump Using an Electronic Calibrator, #1366

	TWA	Ceiling
Flow Rate	1000 ml/min	1000 ml/min
Sample Time	8 hours	10 minutes
Air Volume	480 liters	10 liters
NIOSH REL	50 µg/m ³	200 µg/m ³ (10 min) C

(NIOSH Manual of Analytical Methods [NMAM], Fourth Edition, 8/15/94)

Sampling and Analysis:

1. To set up an impinger sampling train, fill an impinger with the specified volume and type of collection liquid. To protect the pump from splashed or spilled collection liquid, install a solution trap between the impinger and the pump. Solid sorbent can be added to the trap if a volatile liquid is used in the impinger. With flexible tubing, connect the outlet (side arm) of the impinger to the inlet (top) of the trap and connect the outlet (side arm) of the trap to the inlet of the

pump. Request SKC Application Guide #1165 for more information on preparing impinger sampling trains.

2. For calibrating the pump, use the sampling train described above. Using flexible tubing, connect the impinger inlet (top) to an external flowmeter. Calibrate the pump flow rate to the rate specified in the method. When calibration has been completed, remove the impinger used to calibrate the flow. Save it and the collection liquid 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 impinger filled with the appropriate amount of collection liquid. Place the pump, impinger, and trap in the workplace for area sampling. If personal sampling is desired, place the impinger in a holster and attach it near a worker's breathing zone. Attach the pump to the worker's belt. If the impinger is mounted on a worker, avoid activity that could break the glass or cause the collection liquid to splash or spill. 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. Quantitatively transfer the collection liquid to a glass vial, making sure to 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 blank samples of the collection liquid. Blank samples should be subjected to exactly the same handling as the samples except that no air is drawn through them.

8. Pack the samples, blanks, and all pertinent information securely for shipment to a laboratory for analysis.

Storage:

Refrigerate samples at 4 C or lower. Samples may be unstable. Analyze as soon as possible.

Analyzing Method:

High-performance liquid chromatography - electrochemical and ultraviolet detectors (HPLC-ELCHM and UV)

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