Overview

Isocyanate exposure was evaluated in 33 spray painters from 25 Washington State autobody shops. A total of 228 personal breathing zone samples were analyzed for isophorone diisocyanate (IPDI) monomer, 1,6-hexamethylene diisocyanate (HDI monomer), IPDI polyisocyanate, and three polyisocyanate forms of HDI.

The objective of this study was to describe exposures to isocyanates while spray painting, compare them with short-term exposure limits (STELs), and describe the isocyanate composition in the samples.

Key Findings

- Automotive paints contain a variable mixture of isocyanates:
  - There was a significant inverse relationship between the percentage composition of HDI isocyanurate in a given air sample to IPDI and to HDI uretdione.

- Air samples were compared against the two most relevant short-term exposure levels (STELs) for isocyanates:
  - 80% of personal samples exceeded the Oregon-OSHA STEL.
  - 98% of personal samples exceeded the United Kingdom-HSE STEL.

- The STELs had significant limitations:
  - OR-OSHA STEL does not include all polyisocyanates.
  - UK-HSE STEL is derived from monomeric isocyanates, whereas the species present in typical spray coatings are polyisocyanates.

Policy Impact

Current U.S. Occupational Exposure Levels (OELs) fail to adequately address mixed isocyanate exposures such as found in automotive painting; a U.S. OEL for total isocyanates is needed.

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