



Identifying Agents of Epoxy Resin Exposure Among Construction Painters

Characterization and Quantitation of Personal Exposures to Epoxy Paints in Construction Using a Combination of Novel Personal Samplers and Analytical Techniques

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Overview

Epoxy resins appear commonly in products used in construction, including coatings, adhesives, primers, and sealers. Occupational exposures to epoxies can cause allergic contact dermatitis, occupational asthma, hypersensitivity pneumonitis (epoxy-resin lung), and acute decline in lung function. However, there has been limited data collected about quantitative exposure to epoxy resins and limited methods for monitoring exposures in real-world applications. The researchers aimed to develop and implement two new complementary quantitative analytical methods — liquid chromatography–tandem mass spectrometry with online ultraviolet detection and ion chromatography. They applied both simultaneously to characterize products and measure respiratory and skin exposures from epoxy resins among construction painters during bridge painting. They measured workplace exposures to the main component in commercial epoxy resins, bisphenol A diglycidyl ether (BADGE), and its two oligomers (dimer and trimer).

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Read the abstract:

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Key Findings

- Both methods were used successfully, in conjunction with a new CIP-10IM personal sampler, to quantify exposure to epoxy resins during bridge painting.
- Skin exposure and respiratory exposure samples report high levels of BADGE and its oligomers, revealing a high potential for worker exposure through these routes.
- BADGE and its dimer were detected in 100% of the personal air and dermal samples, while the trimer was detected in 89% and 91% of samples, respectively.
- Personal air samples revealed exposures three times higher than the maximum value reported in an earlier study. Workers in the current study often did not wear respirators during roller/brush painting, including when working inside enclosures where considerable airborne epoxide exposures were measured.
- Examination of workers' gloves found high epoxy loads, suggesting high potential for skin exposures via hands. Skin exposure to body parts other than hands was likely due to frequent contamination of head and forearms, especially for workers wearing short sleeve shirts.
- Improved workplace exposure controls are needed to reduce the high exposure risk of epoxy resins.



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