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Solvent-based inks: Chemical category findings

Although solvent-based inks typically offer excellent quality and dependability, they contain relatively high concentrations of VOCs. Oxidizers destroy most stack emissions that would otherwise be released to the environment, but these devices have no effect on emissions in the pressroom, which may eventually be released to the environment. Also, the solvent-based inks in the study contained several chemicals that, under the conditions of the flexo ink study, were predicted to pose clear risk concerns for workers. This chapter summarizes the flexo ink study's health-related findings for the two solvent-based ink product lines.

A chemical category would typically describe a group of chemicals with shared or similar chemical and toxicological properties. The flexo ink study borrowed from EPA's New Chemical Categories (www.epa.gov/opptintr/newchems/chemcat.htm) as a means to group the chemical substances that the partners shared for this study. To determine whether other similar substances would be included in a chemical category, and therefore predicted to express similar health and environmental concerns, category boundary conditions such as molecular structure and weight, water solubility, etc. should be considered.

General population

No chemical categories with *clear concern for risk* to people living near a printing facility were identified in the solvent-based systems that were studied, and most categories presented a negligible concern. The categories of alcohols and propylene glycol ethers (both used as solvents) contained chemicals that showed *potential concern for risk*. Also, the use of press-side additions increased risk concerns for some solvent-based formulations.

Although the general population was not found to be at clear risk concern, the study design made specific assumptions resulting in little exposure to people living adjacent to the facilities. Thus, depending on the conditions at a particular facility, people living near a facility could be at risk for health effects if there were sufficient releases.

Flexo workers

Solvent-based inks had relatively high levels of uncaptured emissions. This is mostly attributable to solvents, which showed clear risk concerns for pressroom workers through inhalation. Because of emissions in the pressroom from solvent-based inks, the study found risk concerns for the following chemical categories:

This highlights the importance of minimizing fugitive emissions through enclosed doctor blades and other equipment and workplace practices.

- Alcohols: systemic and developmental risk
- Alkyl acetates: systemic risk
- Low-molecular-weight hydrocarbons: systemic risk
- Propylene glycol ethers: systemic and developmental risk

Table 8 lists the clear inhalation and dermal risk concerns that were found for workers. Alcohols, alkyl acetates, and propylene glycol ethers showed risk concerns for *both* dermal and inhalation exposure.

Five of the chemical categories in the study contained solvent-based chemicals that showed clear concerns via dermal exposure, and three categories showed clear concerns via inhalation. Two categories — alcohols and alkyl acetates — presented both dermal and inhalation risk concerns.

Chemicals in these categories were predicted to drive worker health concerns. When assessing inks at a flexo facility or developing new formulations, you might start with these categories.

TABLE 8 Clear Occupational Health Risk Concerns for Solvent-Based Inks

Chemical Categories of Clear Risk Concern*	Function in Ink	Exposure Route**
Alcohols	Solvent	dermal, inhalation
Alkyl acetates	Solvent	dermal, inhalation
Hydrocarbons (low molecular weight)	Multiple	inhalation
Inorganics	Multiple	dermal
Organometallic pigments	Colorant	dermal
Propylene glycol ethers	Solvent	dermal

*These chemical categories might be associated with different risks, or with no risk at all, under different study conditions. A category is included in the table if at least one chemical in the category posed a clear risk under the conditions of the study. Not all chemicals in these categories were found to present risk concerns.

**Only pressroom workers were assumed to have exposure via inhalation. Both prep-room and pressroom workers were assumed to have dermal exposure.