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## What aquatic toxicity concerns were identified?

A chemical with aquatic toxicity concerns has the potential to cause harmful long-term effects to aquatic life. This chapter identifies the chemicals that showed medium or high aquatic toxicity in the study.

### Findings on aquatic toxicity

For the flexo study, if 0.1 mg of a chemical in one liter of water could cause a problem for aquatic organisms, the chemical was said to have *high aquatic toxicity*. Similarly, if more than 0.1 mg/liter and up to 10 mg/liter would be needed to cause a problem, a flexo ink chemical was said to have *medium aquatic toxicity*.

Each ink system contained chemicals of high aquatic toxicity:

- Solvent-based system: 11 chemicals
- Water-based system: 8 chemicals
- UV-cured system: 12 chemicals

About half of the ink chemicals in the study showed medium or high aquatic toxicity. Eighteen chemicals had high aquatic toxicity, and another 35 chemicals showed medium toxicity. Table 12 lists these chemicals.



**TABLE 12 Flexo Ink Study Chemicals Showing Aquatic Toxicity**

**High aquatic toxicity**

Amides, tallow, hydrogenated  
*Ammonia*\*  
 C.I. Basic Violet 1,  
 molybdatephosphate  
 C.I. Basic Violet 1,  
 molybdatetungstatephosphate  
 C.I. Pigment Violet 27  
*Dicyclohexyl phthalate*\*  
 Distillates (petroleum), hydrotreated  
 light  
*2-Ethylhexyl diphenyl phosphate*\*  
 Glycerol propoxylate triacrylate  
*n-Heptane*\*  
 1,6-Hexanediol diacrylate  
 2-Isopropylthioxanthone  
 4-Isopropylthioxanthone  
*Mineral oil*\*  
 Resin acids, hydrogenated, methyl  
 esters  
*Styrene*\*  
 Thioxanthone derivative  
 Trimethylolpropane ethoxylate  
 triacrylate

**Medium aquatic toxicity**

Acrylic acid polymer, acidic #1  
 Acrylic acid polymer, acidic #2  
 Alcohols, C11-15-secondary,  
 ethoxylated  
*Ammonium hydroxide*\*  
 2-Benzyl-2-(dimethylamino)-4'-  
 morpholinobutyrophenone  
*Butyl acetate*\*  
 C.I. Pigment Blue 61

C.I. Pigment Red 48, barium salt (1:1)  
 C.I. Pigment Red 48, calcium salt (1:1)  
 C.I. Pigment Red 52, calcium salt (1:1)  
 Citric acid  
 D&C Red No.7  
 Dioctyl sulfosuccinate, sodium salt  
 Diphenyl (2,4,6-trimethylbenzoyl)  
 phosphine oxide  
 Dipropylene glycol diacrylate  
*Ethanolamine*\*  
*Ethyl acetate*\*  
 Ethyl 4-dimethylaminobenzoate  
 1-Hydroxycyclohexyl phenyl ketone  
 Hydroxylamine derivative  
*Hydroxypropyl acrylate*\*  
 Isopropoxyethoxytitanium  
 bis(acetylacetonate)  
 Methylenedisalicylic acid  
 2-Methyl-4'-(methylthio)-2-  
 morpholinopropiophenone  
 Phosphine oxide, bis(2,6-  
 dimethoxybenzoyl) (2,4,4-  
 trimethylpentyl)-  
*Propyl acetate*\*  
 Resin, acrylic  
 Solvent naphtha (petroleum), light  
 aliphatic  
 Styrene acrylic acid polymer #1  
 Styrene acrylic acid polymer #2  
 Styrene acrylic acid resin  
 Tetramethyldecyldiol  
 Titanium diisopropoxide bis (2,4-  
 pentanedionate)  
 Trimethylolpropane propoxylate  
 triacrylate  
 Trimethylolpropane triacrylate

\*Regulated under one or more federal environmental/health statutes.

Because it was not expected that the inks or their wastes would be released to the aquatic environment, water releases and subsequent related risks were not assessed. If any of these inks are ever released untreated to water, however, there could be aquatic risk concern. In fact, four of the chemicals listed in Table 12 — ammonia, butyl acetate, dicyclohexyl phthalate, and styrene — have been regulated under the Clean Water Act.

It is important to store and use chemicals properly, to avoid accidental releases that may end up in water systems. Inks and their wastes should never be put down the drain.



As Table 12 shows, only about 20% (11/53) of these chemicals are regulated by federal laws that protect the environment. Thus, even though the other chemicals in the table were found to exhibit high aquatic toxicity, no specific restrictions exist on their use.

### How to use these findings

About half the chemicals in the flexo ink study were identified as having high or medium toxicity to the aquatic environment. Toxic chemicals were found in every ink system, and the majority of them are not federally regulated. Ink chemicals and wastewater containing ink products can be accidentally spilled or released to the environment. For these reasons, it is up to flexo professionals to take the initiative. To help reduce exposure, and consequently risk, to aquatic environments:

- Never pour inks or ink-related products (such as press-side additions or wash water) down the drain.
- Minimize the use of chemicals that have been found to be toxic to the environment.
- Keep in mind that some unregulated chemicals may still pose hazards to the environment.
- Consider and use alternatives to toxic ink chemicals when available.
- Support research to identify environmentally benign inks and ink chemicals.