

# Polyol Resin Blends Safety and Handling Guidelines

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## Purpose

The Center for the Polyurethanes Industry (CPI) has prepared this guide to provide important health and safety considerations associated with working with polyol resin blends.

Polyurethane foams are often made using “systems,” sometimes called “A-side” and “B-side,” or “iso side” and “resin side.” It is important to know which side of the system (“A-side” or “B-side”) is the diisocyanate and which is the polyol resin blend. The hazards of the polyol resin are different from those of the diisocyanates, and different precautions should be taken when handling the individual components. This guide gives a brief summary of hazards that may be associated with the “resin side” of systems and addresses important issues to consider in the safe handling of these chemicals.

This guide does not provide information about handling the “iso side.” Handling information is contained in other documents produced by CPI. (See “Additional Information” page 4). Similarly, this guide does not contain information on either the hazards associated with solvents used for equipment cleanup or the hazards associated with specific polyol formulations. For that information, refer to the product-specific Safety Data Sheet (SDS), or consult the supplier.



Center for the  
Polyurethanes Industry

### Chemical Composition of Polyol Resin Blends

To make a polyurethane, a polyol is reacted with a diisocyanate. A number of additional ingredients are required to achieve the desired properties in a polyurethane foam. These additional ingredients are typically blended with the polyol to form what we call a “polyol resin blend.” These ingredients may include catalysts, surfactants, colorants (pigments or dyes), blowing agents, and flame retardants. Customers who purchase polyurethane foam systems receive a two-part package, consisting of a diisocyanate and a polyol resin blend. To make polyurethane foam, the user meters the “A-side” and “B-side” in the proper ratio, using a proportioning pump to a mix head or spray gun, where the ingredients are mixed and dispensed.

### Acute Health Hazards and Handling Precautions

Acute health hazards associated with the typical ingredients in a polyol resin blend are summarized below and in Table 1. General recommendations to minimize exposure to these ingredients also are provided.

*There are four general recommendations for handling polyol resin blends:*

- As with any chemical, review the SDS from the manufacturer before use. There should be a specific SDS for the polyol resin blend. Follow all of the manufacturer’s recommendations.
- Don’t eat or smoke where chemicals are handled to prevent inadvertant ingestion of these chemicals.
- Avoid eye or skin contact.
- Clean up spills promptly to minimize the potential for falls. Polyol resin blends are slippery.

### Polyols

The major ingredient in polyol resin blends is a polyol or a mixture of several polyols. Although polyols differ in molecular weight, and somewhat in chemical structure, all are very large alcohol-type molecules. Polyols typically make up at least 70% by weight of a polyol resin blend.

In addition to the polyol, polyol resin blends contain a number of additives that may be hazardous (see below), which is why users avoid skin and eye contact with the blend.

**Note:** A hazard associated with most polyols is that—spilled material can be very slippery.

### Catalysts

Some amine catalysts and various metal catalysts (e.g., tin, potassium, bismuth) can be strongly basic. Catalysts may cause respiratory, eye and/or skin irritation. Some amine catalysts are potential skin sensitizers, causing persistent dermatitis and skin problems, and/or are corrosive to the skin. The vapors of some amine catalysts can cause vision to

become hazy and for halos to appear around bright lights; these effects are usually temporary in nature. Each catalyst package may vary depending upon the application and manufacturer. Users of “systems” do not handle the catalyst package separately. It is already incorporated into the polyol resin blend at typically less than 10% by weight, which can reduce the hazards associated with the catalyst package.

### Surfactants

There are many commercial silicone surfactants whose structure and/or composition have been varied to obtain specific properties in the finished polyurethane foam. Surfactants, in general, are minimally irritating or non-irritating and of low order toxicity by all typical routes of administration. However, some surfactants may cause slight irritation to the eyes, skin, and respiratory system. Generally, surfactants are a minor constituent of the polyol resin blend formulation (0 to 2% by weight).

Some surfactants may be combustible or flammable; take appropriate fire safety precautions.

### Colorants

The coloring of polyurethane foam is obtained with pigment pastes, dyes, or dispersions, collectively called “colorants.” Their presence at low levels (typically less than 1% by weight) in the blended polyol resin can minimize the potential for significant exposure.

### Blowing Agents

A blowing agent is the ingredient that forms the cells in polyurethane foam. Blowing agents that currently are used include hydrofluorocarbons (HFCs), hydrocarbons (pentanes), liquid carbon dioxide (CO<sub>2</sub>), acetone, and water (reacts with diisocyanate to form CO<sub>2</sub>).

Like CO<sub>2</sub>, many blowing agents are heavier than air. In high concentrations, they can displace oxygen available for breathing. HFCs in high concentrations can cause irregular heartbeat and depression of the central nervous system. Use general and/or local ventilation as necessary to prevent overexposure. Some blowing agents also are irritants to the eyes and skin. Hydrocarbons and acetone are flammable; take appropriate fire safety precautions.

Do not expose containers of polyol resin blends that contain blowing agent to elevated temperatures. Elevated temperatures may result in an over-pressurized or bulging container. Such containers may rupture or explode forcefully. Follow the manufacturer’s recommended storage temperatures.

### Flame Retardants

Some of the polyol resin blends used to make polyurethane foam for building construction contain flame retardants. Because a variety of chemicals are used as flame retardants, it is difficult to offer more than general guidelines, so consult the SDS for more information on potential health effects. Flame retardants are incorporated into the polyol resin blend at concentrations of up to 40% by weight. Avoiding skin and eye contact with the resin blend minimizes exposure to these materials.

Table 1—Acute Health Hazards of Polyol Resin Blends

Component	Chemical Composition	Eye Irritant	Skin Irritant
Polyols	Polyhydric alcohols	Yes (some)	Yes (some)
Catalysts	Amines, Metallic salts	Yes	Yes
Surfactants	Silicones	Yes (some)	Yes (some)
Colorants	Carbon Black, Dyes, Metal complexes	Yes	Yes
Blowing Agents	HFCs, Hydrocarbons, CO <sub>2</sub> , Acetone and Water	Yes (some)	Yes (some)
Flame Retardants	Brominated compounds, Antimony compounds, Chlorinated phosphorus compounds	Yes	Yes (some)

## Handling Information

### Personal Protective Equipment

Personal Protective Equipment (PPE) is used for protection from potential chemical exposure during activities such as material transfer, maintenance, and processing. Some examples of PPE recommended, depending on the activity, is listed below. See the manufacturer's SDS for more detailed information on recommended PPE.

- Safety glasses with side shields or chemical goggles. For some operations, a face-shield is required by OSHA.
- Steel-toed shoes when handling drums or other heavy containers.
- Chemical resistant gloves. Because most polyurethane workers handling polyol resin blends also are working with diisocyanates, using gloves approved for diisocyanates is typically recommended (see "Additional Information" page).
- Organic vapor respirator with a particulate prefilter may be worn if vapors are detected or irritating. Note that this type of respirator may not be effective for HCFCs and HFCs; instead a supplied air respirator may be needed. Check with your supervisor to determine if respirators are required to protect against exposure to vapors in handling polyol resin blends under the circumstances unique to your workplace. If so, wear them when instructed. Employers must comply with the OSHA Respiratory Protection Standard (29 CFR 1910.134).

The PPE specified above is for routine handling only. Additional equipment may be required for emergency response operation (29 CFR Part 1910.120). (See “Emergency Response,” page).

### Ventilation

When working with polyol resin blends, use adequate ventilation and do not breathe vapors. Normal air movement may provide adequate ventilation if there are no obstructions and the area is relatively open. However, in confined spaces or poorly ventilated areas, mechanical exhaust may be required for ventilation.

### Decontamination

Perform proper decontamination of exposed clothing and apparatus. Typically, soap and water are used; however, review the manufacturer’s SDS for information on the recommended decontamination solutions to use with polyol resin blends. Used decontamination fluids must be handled and disposed of according to OSHA regulations.

## Fire and Explosion Hazards

In general, the flash point of polyol resin blends that do not contain hydrocarbons or acetone will be high enough so as not to present a fire or explosion hazard. However, those that contain hydrocarbons or acetone may have lower flashpoints, and these types of polyol blends do present fire and explosion hazards. As with most fires, combustion of polyol resin blends will produce carbon monoxide and carbon dioxide. Additional compounds that may be generated depending on formulation include nitrogen oxides, halogen acids, phosphorus oxides, and others. (See “Emergency Response” page for additional information on fire).

## Emergency Response

Fires, spills, bulging drums, and other emergencies involving polyol resin blends require immediate responses. If you are not a trained, designated emergency responder, leave the area immediately and notify the appropriate emergency response personnel.

If you need assistance with a spill or other emergency involving polyol resin blends, call CHEMTREC at 1-800-424-9300. CHEMTREC operators are available 24 hours a day, seven days a week.

### First Aid

See the manufacturer’s SDS for recommended first aid procedures. General guidance is provided below.

- Eye Contact: Flush eyes with water, preferably from an eyewash fountain for up to 15 minutes.

- Skin Contact: Wash skin with soap and water. Do not use solvents! Any clothing or items such as shoes, belts, and watchbands that have been contaminated with polyol resin blends should be properly discarded.
- Ingestion: If swallowed, seek medical attention immediately. Do not induce vomiting.

## Waste Disposal Considerations

Dispose of waste in compliance with your local, state and federal regulations.

### Disposal of Empty Drums

- Dispose of drums in accordance with applicable regulations (see “Additional Information” page).
- Empty drums may contain liquid or vapor residue, which may be dangerous. Do not hammer, strike, torch cut, weld, braise, solder, drill, grind or expose containers to heat or flame.
- Drums must be “drip dry” (i.e., emptied by pouring, pumping or aspirating) before disposal.

*Note:* The “one-inch” residue rule, stated in 40 CFR section 261.7, for determining whether a drum is empty applies to non-flowable products (e.g., very viscous resins).

Empty drums can be reconditioned. Contact the Reusable Industrial Packaging Association (RIPA - [www.reusablepackaging.org](http://www.reusablepackaging.org)) to locate a drum reconditioner near you.

## Storage

General guidance is provided below:

- Maintain good housekeeping in the work area.
- Store in an enclosed, ventilated area.
- Segregate containers from materials that are incompatible with polyols.
- Provide secondary containment.
- Store materials within the temperature range recommended by supplier.

### Additional Information

Consult these Center for the Polyurethanes Industry (CPI) publications for additional information:

*PMDI User Guidelines for Chemical Protective Clothing Selection (AX178)*

*Guidance for Working with MDI and Polymeric MDI: Things You Should Know (AX205)*

*Guidance for Working with TDI: Things You Should Know (AX202)*

*TDI User Guidelines for Chemical Protective Clothing Selection (AX179)*

*Guidelines for the Responsible Disposal of Wastes and Containers from Polyurethane Processing (AX151)*

All publications are available free on CPI's website at  
<http://polyurethane.americanchemistry.com>

### Legal Notice

This guidance document was prepared by the American Chemistry Council's Center for the Polyurethanes Industry. It is intended to provide general information to professional persons who may handle polyol resin blends. It is not intended to serve as a substitute for in-depth training or specific handling, safety, or storage requirements, nor is it designed or intended to define or create legal rights or obligations. It is not intended to be a "how-to" manual, nor is it a prescriptive guide. All persons involved in handling polyol resin blends have an independent obligation to ascertain that their actions are in compliance with current federal, state and local laws and regulations and should consult with legal counsel concerning such matters. The guidance is necessarily general in nature and individual companies may vary their approach with respect to particular practices based on specific factual circumstance, the practicality and effectiveness of particular actions and economic and technological feasibility. Neither the American Chemistry Council, nor the individual member companies of the Center for the Polyurethanes Industry of the American Chemistry Council, nor any of their respective directors, officers, employees, subcontractors, consultants, or other assigns, makes any warranty or representation, either express or implied, with respect to the accuracy or completeness of the information contained in this guidance document; nor do the American Chemistry Council or any member companies assume any liability or responsibility for any use or misuse, or the results of such use or misuse, of any information, procedure, conclusion, opinion, product, or process disclosed in this guidance document. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

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