

Polyol Resin Blends Safety and Handling Guidelines

ISSUE AX228 • FEBRUARY 2022

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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.

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 polyurethane. These additional ingredients are typically blended with the polyol to form what is called a “polyol resin blend.” These ingredients may include catalysts, surfactants, colorants (pigments or dyes), blowing agents, and flame retardants. Customers who purchase polyurethane systems receive a two-part package, consisting of a diisocyanate (usually designated as A-side) and a polyol resin blend (B-side). To make polyurethane, the “A-side” and “B-side” are metered in the proper ratio, using a proportioning pump that feeds to a mix head or spray gun, where the ingredients are mixed and dispensed. Consult the polyurethane system technical datasheet for the proper mix ratio and other processing considerations.

Acute Health Hazards and Handling Precautions

Acute health hazards associated with the typical components in a polyol resin blend are summarized below. Users of the A-side and B-side typically do not handle the polyol resin blend components separately; they are usually pre-blended by the supplier.

There are four general recommendations for handling polyol resin blends:

- As with any chemical, review the Safety Data Sheet from the manufacturer before use. There should be a specific SDS for the polyol resin blend. Follow manufacturer’s recommendations.

- Inadvertent ingestion of chemicals can be avoided by prohibiting eating and smoking in chemical handling areas.
- Avoid eye and skin contact.
- Clean up spills promptly to minimize the potential for falls. Polyol resin blends are typically slippery.

Polyols

The major ingredient in polyol resin blends is a polyol or a mixture of several polyols. Polyols are widely used in polymer chemistry and, along with diisocyanates, are the essential building blocks in the manufacture of polyurethane. Although polyols differ in molecular weight and somewhat in chemical structure, all are generally very large alcohol-type molecules. Polyols typically make up at least 70% by weight of a polyol resin blend. Polyols are generally considered low health hazard raw materials during handling and use. Consult the US SDS Section 3 for additional details on the chemical composition.

Catalysts

The catalysts used for a particular polyol resin blend may vary depending upon the application and manufacturer. The catalyst controls the relative reaction rates of the isocyanate with polyol and water. Users of the A-side and B-side do not handle the catalysts separately. They are already incorporated into the polyol resin blend at typically less than 10% by weight, which can reduce the hazards associated with the catalysts. Consult the US SDS Section 2 for the hazard identification of the resin blend.

Polyol resin blends often employ amine catalysts and various metal catalysts (e.g., tin, potassium, bismuth), and these substances can be strongly basic. Catalysts may cause respiratory, eye, and/or skin irritation. A few amine catalysts are potential skin sensitizers, causing persistent dermatitis and skin problems, while many others are corrosive to the eyes and skin. Exposure to

the vapors of some amine catalysts can cause vision to become hazy. Amine exposure can also lead to the appearance of halos around bright lights; these effects are usually temporary in nature.

Surfactants

Polyol resin blends typically utilize silicone-based surfactants which control polyurethane cell size and cell opening. The most important function of the surfactant in foams is cell stabilization. Surfactants are usually a minor constituent of the polyol resin blend formulation (0 to 2% by weight). Silicone surfactants have a chemical structure and/or composition that is varied to give the finished polyurethane foam specific properties. Surfactants are generally considered low health hazard raw materials during handling and use. Exposure to surfactants may cause slight irritation to the eyes, skin, and respiratory system.

Colorants

Polyurethane can be colored with pigment pastes, dyes, or dispersions, which are collectively called “colorants.” Their presence at low levels (typically less than 1% by weight) in the polyol resin blend results in them having minimal hazard and exposure potential.

Blowing Agents

A blowing agent is the ingredient that forms the cells in polyurethane foam. Blowing agents that currently are used include hydrofluoroolefins (HFOs), hydrofluorocarbons (HFCs), hydrocarbons (pentanes), formic acid, liquid carbon dioxide (CO₂), and water (reacts with diisocyanate to form CO₂). Some blowing agents are added as a third stream during the manufacturing process. In order to align with the Kigali Amendments to the Montreal Protocol, polyurethane manufacturers are transitioning away from HFC blowing agents in favor of lower global warming potential alternatives.

Many blowing agents are heavier than air. In high concentrations, they can displace oxygen available for breathing. HFOs and HFCs in high concentrations can cause irregular heartbeat and depression of the central nervous system, causing drowsiness and/or dizziness. General and/or local ventilation should be used to prevent overexposure. Some blowing agents also are irritants to the eyes and skin.

Containers of polyol resin blends that contain a blowing agent should not be exposed to elevated temperatures. Elevated temperatures may result in an over-pressurized or bulging containers, and such containers may rupture forcefully. The manufacturer’s recommended storage temperatures should be followed. In addition, pentanes and HFC-152a are flammable; appropriate fire safety precautions and monitoring should be in place.

Flame Retardants

Some polyol resin blends used to make polyurethane contain flame retardants, based upon the application. 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 30% by weight. Avoiding skin and eye contact with the resin blend minimizes exposure to these materials.

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 recommended PPE, depending on the job task, are listed below. [See the manufacturer's SDS for more detailed information on recommended PPE for the specific polyol resin blend being handled.](#)

- Safety glasses with side shields or chemical goggles. For some operations, a faceshield may be needed.
- Steel-toed shoes when handling drums or other heavy containers.
- Chemical resistant gloves. Many polyurethane workers handling polyol resin blends also are working with diisocyanates and other chemicals; therefore it is recommended to choose gloves based on all chemicals that are being handled (see "Additional Information" section).
- An air purifying respirator with organic vapor cartridges may be worn if vapors are present at levels greater than occupational exposure limits. Note that this type of respirator may not be effective for HFOs and HFCs; instead a supplied air respirator may be needed. The results of industrial hygiene air monitoring will determine if respirators are required to protect against exposure to vapors when handling polyol resin blends under the circumstances unique to the job task.
- 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" section).

Ventilation

When working with polyol resin blends, adequate ventilation should be used to minimize airborne vapor concentrations. Normal air movement may provide adequate ventilation if there are no obstructions and the area is relatively large and open. However, in confined spaces or poorly ventilated work areas, general and/or local exhaust ventilation may be required. If ventilation is needed, the results of industrial hygiene air monitoring can help determine the type.

Decontamination

Review the manufacturer's SDS Section 6 accidental release measures for information on the recommended decontamination solutions to use with polyol resin blends. Used decontamination fluids must be handled and disposed of appropriately.

Fire and Explosion Hazards

In general, the flash point of polyol resin blends that do not contain flammable blowing agents will be high enough so as not to present a fire or explosion hazard. However, those that contain flammable blowing agents 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, phosphorus oxides, and other compounds. See SDS Section 5 for fire-fighting measures.

Emergency Response

Fires, spills, bulging drums, and other emergencies involving polyol resin blends require immediate responses. Only trained, designated emergency responders should attempt to respond to emergencies or spills. All others should leave the area immediately and notify the appropriate emergency response personnel.

For assistance with a spill or other emergencies in the US and Canada 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. Seek immediate medical attention.
- Skin Contact: Wash skin with soap and water. Do not use solvents! Items such as shoes, belts, and watchbands that have been contaminated with polyol resin blends should be properly discarded. Contaminated clothing should be removed and properly laundered. Seek medical attention if irritation develops.
- Ingestion: If swallowed, seek medical attention immediately. Do not induce vomiting.
- Inhalation: Move to fresh air. Qualified person may aid in breathing if necessary. Seek immediate medical attention.

Suggested Spill Kit

A spill kit should be located in the work area to address small releases of polyol resin blends (and diisocyanates). Items in the spill kit may include

- rubber mat to cover catch basin
- pail of sand to cover mat
- bags of absorbent material
- absorbent socks
- shovel, squeegee, brooms, and empty drums
- neutralizing solution
- appropriate PPE

Waste Disposal Considerations

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

Disposal of Empty Containers

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

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

It is good practice to recondition empty containers that are in good condition. Contact the Reusable Industrial Packaging Association (RIPA – www.reusablepackaging.org) to locate a container reconditioner near you.

Storage

General guidance is provided below:

- Maintain good housekeeping in the work area.
- Segregate containers from materials that are incompatible with polyols.
- Provide secondary containment.
- Reference manufacturer SDS Section 7 material handling and storage.
 - o Store materials in an enclosed, ventilated area.
 - o Store materials within the temperature range recommended by the supplier.

Additional Information

Consult the Center for the Polyurethanes Industry (CPI) Online Resource Library for more publications for additional information:

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

Guidance for the Selection of Personal Protective Equipment for MDI Users (AX178)

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

Guidance for the Selection of Personal Protective Equipment for TDI Users (AX179)

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

All publications are available free on CPI's website at [Products, Resources and Document Library \[americanchemistry.com\]](https://www.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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