

Global Product Strategy (GPS) Safety Summary

Polyethylene

This GPS Safety Summary is a high-level summary intended to provide the general public with an overview of product safety information on this product. It is not intended to provide emergency response, medical or treatment information, nor to provide an overview of all safety and health information. This summary is not intended to replace the Safety Data Sheet. For detailed guidance on the use or regulatory status of this product, please consult the Safety Data Sheet and the Product Stewardship Bulletin (PSB).

Chemical Identity

Chemical name: Polyethylene Homopolymer

CAS number: 9002-88-4

Molecular formula: $(C_2H_4)_n$

Chemical name: 1-Butene, polymer with ethene

CAS number: 25087-34-7

Molecular formula: $(C_4H_8)_x(C_2H_4)_n$

Chemical name: Ethylene Vinyl Acetate Copolymer

CAS number: 24937-78-8

Molecular formula: $(C_4H_6O_2)_x(C_2H_4)_n$

Chemical name: 1-Hexene, polymer with ethene

CAS number: 25213-02-9

Molecular formula: $(C_6H_{12})_x(C_2H_4)_n$

Chemical name: 1-Octene, polymer with ethene

CAS number: 26221-73-8

Molecular formula: $(C_8H_{16})_x(C_2H_4)_n$

Uses and Applications

Polyethylene is made by the polymerization of ethylene. Copolymers of polyethylene are produced by polymerizing the ethylene with other co-monomers such as Butene, Hexene, Octene and Vinyl Acetate. These co-monomers impart certain polymer properties that make them useful in a wider range of end uses.

Polyethylene is classified into several different categories based mostly on its density and branching. The mechanical properties of PE depend significantly on variables such as the extent and type of branching, the crystal structure and the molecular weight. The most important polyethylene grades are HDPE, LLDPE and LDPE.

Polyethylene resins are versatile materials used in applications such as:

- Industrial and consumer packaging
- Beverage cups and bottles
- Wire and cable insulation
- Automotive components
- Household appliances
- Toys
- Pipe
- Healthcare (with products with tradename *Purell*)

High density polyethylene (HDPE):

Used to manufacture grocery, merchandise and trash bags; food containers for frozen desserts to margarine; plastic caps and closures; liners for boxes of cereal and crackers; plastic drink cups and toys; dairy crates; bread trays; pails for items from paint to fresh fruits and vegetables; safety equipment, such as hard hats; house wrap for insulation; bottles for household items, industrial chemicals and motor oil; milk, water, and juice bottles; large (rotomolded) tanks for storing liquids such as agricultural and lawn care chemicals; pipe, and healthcare applications (with products with tradename *Purell*).

Linear low-density polyethylene (LLDPE):

Used to manufacture garbage and lawn-leaf bags; industrial can liners; house wares; lids for coffee cans and margarine tubs; dishpans, home plastic storage containers, and kitchen trash containers; large (rotomolded) toys like outdoor gym sets; drip irrigation tubing; insulating resins and compounds used to insulate copper and fiber optic wiring; shrink wrap for multipackaging canned food, bag-in-box bags, produce bags and pallet stretch wrap.

Low density polyethylene (LDPE):

Used to manufacture food packaging films; plastic bottles for packaging food and personal care items; dry cleaning bags; ice bags; pallet shrink wrap; heavy-duty bags for mulch and potting soil; boil-in-bags; coatings on flexible packaging products and paper board such as milk cartons.

Ethylene vinyl acetate is a specialized form of LDPE used in foamed sheets, bag-in-box bags, vacuum cleaner hoses, medical tubing, clear sheet protectors, flexible binders, and healthcare applications (with products with tradename *Purell*).

Physical / Chemical Properties

Polyethylene resins are solid polymers that are stable at ambient temperatures. When heated to very high temperatures, the resins may burn or decompose to flammable hydrocarbons. Most polyethylene grades have good chemical resistance.

Common commercial grades of medium and high-density polyethylene have a melting point in the range of 120°C to 130°C (248°F to 266°F). The melting point for average, commercial, low density polyethylene is typically 105°C to 115°C (221°F to 239°F).

Polyethylene dust may form explosive mixtures with air.

Health Effects

At ambient temperatures, health hazards are negligible because of the polymers' high molecular weight, minimal toxicity and general inertness. Polyethylene polymers have a low irritation and sensitization potential. Hot material may cause thermal burns. At processing temperatures, irritating fumes may cause soreness in the nose and throat; coughing may result. Physical hazards can be present if product is spilled due to slipping hazards.

United States OSHA and European regulations consider polyethylene polymers as non-hazardous with regard to health hazards. The United States Department of Transportation (DOT) considers polyethylene polymers to be non-hazardous.

Environmental Effects

Polyethylene resins are not expected to be toxic to the environment. Polyethylene is not considered biodegradable as it biodegrades at a slow rate and may persist in the environment.

Exposure

During handling or processing of polyethylene resins, exposure to hot material, fumes and dust may take place. For such activities, exposure should be controlled by selecting and applying the appropriate Risk Management Measures.

Spillage of polyethylene resin may cause exposure to the environment, which can be minimized by proper design of equipment, handling procedures and cleaning-up spilled pellets or granules immediately.

Risk Management Measures

For detailed guidance on the use of polyethylene polymers, the Safety Data Sheet should be consulted.

In general, recommended Risk Management Measures will include, but may not be limited to the following:

- Avoid contact with strong oxidizers, excessive heat, sparks or open flame.
- Clean-up spilled pellets or granules to prevent slipping hazard, or environmental exposure
- Ventilate area during handling or processing of polyethylene resins to prevent accumulation of dust and fumes.
- Use appropriate Personnel Protective Equipment (PPE) when dust or fumes are present.

In addition, the following measures will help reduce the loss of pellets to the environment:

- Bulk-handling equipment is to minimize pellet leakage.
- Screening placed in storm drains.
- Proper emptying and sealing of bulk containers (rail or truck) prior to shipment to prevent loss of residual pellets from unsealed "empty" bulk cars and trucks.

Regulatory Information / Classification and Labeling

For a detailed overview of the regulatory status of this substance, please refer to the Product Stewardship Bulletin available from the LyondellBasell corporate website.

For a detailed overview of the classification and labeling of this product, please refer to the regional (Material) Safety Data Sheet, which can be found on the LyondellBasell corporate website.

Conclusion Statements

- Polyethylene resins are versatile materials with a wide range of uses in consumer and industrial end-use applications.
- Polyethylene is considered non-hazardous to humans and the environment.
- During processing of polyethylene resins, the material can be hot, irritating fumes may be present, and dust can be formed. The use of personal protective equipment and good ventilation is recommended during the processing of these resins.

Contact Information within Company

For further information on this product in general, please consult the LyondellBasell corporate website (www.lyb.com).

Date of issue

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Disclaimer

Before using a product sold by a company of the LyondellBasell family of companies, users should make their own independent determination that the product is suitable for the intended use and can be used safely and legally.

SELLER MAKES NO WARRANTY; EXPRESS OR IMPLIED (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY WARRANTY) OTHER THAN AS SEPARATELY AGREED TO BY THE PARTIES IN A CONTRACT.

This product(s) may not be used in:

- (i) any U.S. FDA Class I, Health Canada Class I, and/or European Union Class I medical devices, without prior notification to Seller for each specific product and application; or
- (ii) the manufacture of any of the following, without prior written approval by Seller for each specific product and application: U.S. FDA Class II Medical Devices; Health Canada Class II or Class III Medical Devices; European Union Class II Medical Devices; film, overwrap and/or product packaging that is considered a part or component of one of the aforementioned medical devices; packaging in direct contact with a pharmaceutical active ingredient and/or dosage form that is intended for inhalation, injection, intravenous, nasal, ophthalmic (eye), digestive, or topical (skin) administration; tobacco related products and applications, electronic cigarettes and similar devices, and pressure pipe or fittings that are considered a part or component of a nuclear reactor.

Additionally, the product(s) may not be used in: (i) U.S. FDA Class III Medical Devices; Health

Canada Class IV Medical Devices; European Class III Medical Devices; (ii) applications involving permanent implantation into the body; (iii) life-sustaining medical applications; and (iv) lead, asbestos or MTBE related applications. All references to U.S. FDA, Health Canada, and European Union regulations include another country's equivalent regulatory classification.

Users should review the applicable Safety Data Sheet before handling the product.

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