Product Safety Assessment
Polypropylene

Select a Topic:

Names

- CAS No. 9003-07-0
- CAS No. 9010-79-11
- Polypropylene
- PP
- 1-Propene, homopolymer
- Propene, polymer with ethane
- DOW™ polypropylene resins
- INSPIRE™ Performance Polymers

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Product Overview

- DOW™ polypropylene (PP) resins are versatile, linear polyolefin polymers and copolymers that can adapt to a wide range of fabrication methods and applications.[1] For further details, see Product Description.
- PP is a versatile polymer used in virtually all end-use markets for plastics, including flexible and rigid films and packaging, consumer durables, health and hygiene products, automotive parts, industrial sheet and pipe, compounding materials, and fibers.[2] For further details, see Product Uses.
- Prolonged contact with PP is essentially nonirritating to skin. Solids or dust may cause eye irritation or corneal injury due to mechanical action. Although PP has very low toxicity, swallowed PP material may cause choking or gastrointestinal blockage.[3] For further details, see Health Information.
- Because PP resins are used extensively in food packaging and other consumer products, consumer contact is likely. Resins used for food contact are in compliance with applicable U.S. Food and Drug Administration (FDA) regulations and European Union (EU) directives/regulations. For further details, see Exposure Potential.
- Exposure to elevated temperatures can cause PP to decompose. Decomposition products can include trace amounts of hydrocarbons. Fumes from decomposition or burning can be irritating. Pneumatic conveying and other mechanical handling operations can generate combustible dust. To reduce the potential for dust explosions, do not permit dust to accumulate.[4] For further details, see Physical Hazard Information.
- PP is a water-insoluble polymeric solid and is expected to be inert in the environment.[5] See Environmental Information.

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Manufacture of Product

- **Capacity**[6] **–** Worldwide capacity for PP is over 46 million metric tonnes (100 billion pounds). The Dow Chemical Company ("Dow") produces polypropylene at facilities in Freeport and Seadrift, Texas (USA); and Schkopau and Wesseling, Germany.
- **Process**[7] **–** Production of polypropylene takes place by slurry, solution, or gas-phase polymerization processes. Propylene monomer is subjected to heat and pressure in the presence of a catalyst to form the polymer. Polymerization is usually achieved at relatively low temperature and pressure. Differences in catalyst and production conditions can be used to control the properties of the polymer.

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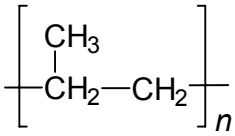
Product Description[8,9,10]

Polypropylene (PP) polymers are linear polyolefins with the repeating structure shown below.



PP resists stress-cracking and offers excellent electrical and chemical resistance at higher temperatures. Additives are incorporated into commercially produced PP resins to protect the polymer during processing and to enhance end-use performance. Different grades and products, including copolymers with small amounts of other olefin monomers, are available with properties designed to match application requirements. Some DOW™ polypropylene products are marketed under the tradename INSPIRE™ Performance Polymers.

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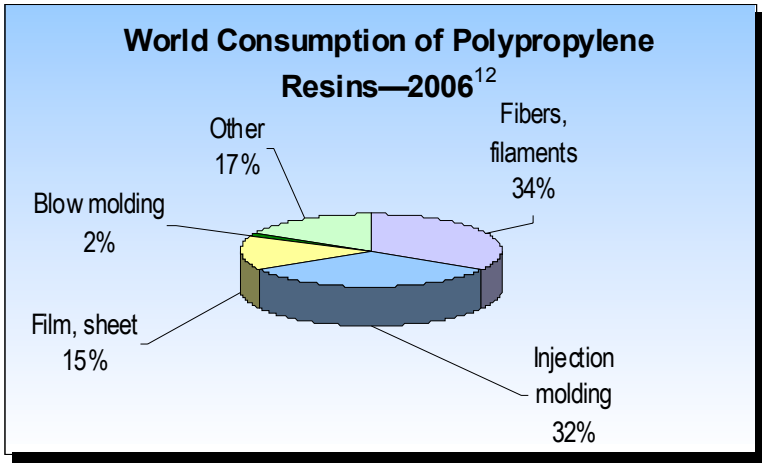
Product Uses[11,12]

PP can be processed by most common thermoplastic-processing methods. The pie chart shows the amount of PP that is processed by different methods. Following is a list of some of the end-uses for PP:



Flexible packaging

- Food and confectioneries
- Tobacco (product packaging)
- Clothing

Rigid packaging

- Caps and closures
- Reusable and collapsible/stackable crates
- Bottles for condiments, detergent, toiletries, and other markets
- Thin-walled containers (e.g. yogurt containers)

Automotive

- Interior—dashboards and skins
- Exterior—bumpers, cladding, and trim

Consumer products
- Housewares
- Furniture
- Appliances
- Luggage
- Toys
- Battery cases

Fiber
- Tape and strapping
- Bulk continuous filament
- Staple fibers

Industrial
- Sheet
- Pipe
- Compounding material
- Returnable transport packaging (RTP)

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Exposure Potential[13]

Polypropylene is used in the production of industrial and consumer products. Based on the uses for PP, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a PP manufacturing facility or in the various industrial or manufacturing facilities that use PP. Those working with PP in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Good housekeeping and control of dusts are necessary for safe handling of this product. Spilled material may result in a slipping hazard. Each manufacturing facility should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit unnecessary PP exposure. See Health Information.
- **Consumer exposure to products containing PP** – DOW™ polypropylene resins are not sold for direct consumer use, but they are used as raw materials to make food packaging materials and other products handled by consumers. PP resins are fabricated into many consumer products. It is likely most everyone uses plastic products or handles packaging made with PP or PP blends almost daily. Plastics can contain residual or unreacted quantities of monomers and process additives such as antioxidants. These materials are tightly controlled to maintain levels below regulatory limits. The U.S. Food and Drug Administration (FDA) as well as European Union food-contact regulatory authorities, recognizing the potential for small amounts of substances used to make plastics to migrate to food, closely regulate the substances used to make plastic containers and materials like wraps that come into contact with food.[14] During the approval process, these authorities consider the migration of substances added to regulated plastics and their toxicological properties to assure that the use is well within the margin of safety. The authorities evaluate plastics and the additives used in them at the temperatures under which containers or wraps made from the plastic are likely to encounter during ordinary use. This would include temperatures expected during the use of materials to heat or reheat food in microwave ovens. For more information on the use of plastics in microwave ovens please visit the "Microwaving with Plastics," section of the Plastics Division of the American Chemical Council's PlasticsInfo.org website.[15] See Health Information.
- **Environmental releases** – In the event of a spill, the focus is on containing the spill to prevent contamination of soil and surface or ground water. Sweep up spilled material. Collect

recovered material in suitable and properly labeled containers. See Environmental, Health and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, the material should be captured, collected and reprocessed, or disposed of according to applicable governmental requirements. See Environmental, Health and Physical Hazard Information.
- **In case of fire** – Deny any unnecessary entry into the area. Soak area thoroughly with water to cool and prevent reignition. If material is molten, do not apply a direct water stream. Use water fog, fine water spray, or a dry-chemical extinguisher to fight a fire. Pneumatic conveying and other mechanical handling operations can generate combustible dust. To reduce the potential for dust explosions, do not permit dust to accumulate. Dense smoke is released when product is burned without sufficient oxygen. Follow emergency procedures carefully. See Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

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Health Information[16]

DOW™ PP resins used for food-contact applications are in compliance with applicable U.S. Food and Drug Administration (FDA) regulations and EU directives for consumer safety.

Prolonged contact with PP is essentially nonirritating to the skin. Solids or dust may cause eye irritation or corneal injury due to mechanical action. Any additives are encapsulated in the product and are not expected to be released under normal processing conditions. Polypropylene is often processed in molten form. Contact with molten material can cause severe skin burns.

Although PP has very low toxicity, if swallowed it may cause choking or gastrointestinal blockage.

For more information, see the relevant Safety Data Sheet.

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Environmental Information[17]

Polypropylene is not acutely toxic, but pellets or beads may mechanically cause harmful effects if ingested by waterfowl or aquatic life. No bioconcentration (accumulation in the food chain) is expected because of the relatively high molecular weight. PP is not water soluble and is expected to be inert in the environment. In the terrestrial environment, PP is expected to remain in the soil. In water, PP will float. Although some surface photodegradation is expected with exposure to sunlight, no appreciable biodegradation is expected.

For more information, see the relevant Safety Data Sheet.

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Physical Hazard Information[18]

Exposure to elevated temperatures can cause PP to decompose. Decomposition products can include trace amounts of hydrocarbons. Fumes from decomposition or burning can be irritating.

For more information, see the relevant Safety Data Sheet.

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Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of polypropylene. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet, Technical Data Sheet, or Contact Us.

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Additional Information

- Safety Data Sheet (www.dow.com/webapps/msds/msdssearch.aspx)
- Technical Data Sheet (www.plastics.dow.com/ – select the desired geographic area and the relevant product using the product finder)
- Contact Us (http://plastics.dow.com/plastics/na/contact/)
- The British Plastics Foundation website: About the Industry, Plastics Materials, Polypropylene. (http://www.bpf.co.uk/Plastipedia/Polymers/PP.aspx)
- Borruso, Andrea, "Polypropylene Resins," *Marketing Research Report: Chemical Economics Handbook,* SRI Consulting, September 2007
- *Dow H734-52RNA Polypropylene Resin Material Safety Data Sheet*, The Dow Chemical Company, October 3, 2008

For more information about DOW™ polypropylene products, visit the Dow Plastics web site at http://plastics.dow.com/about/polypropylene.htm.

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References

1 The British Plastics Foundation website: About the Industry, Plastics Materials, Polypropylene. (http://www.bpf.co.uk/Plastipedia/Polymers/PP.aspx), accessed June 11, 2009.
2 The British Plastics Foundation website: About the Industry, Plastics Materials, Polypropylene. (http://www.bpf.co.uk/Plastipedia/Polymers/PP.aspx), accessed June 11, 2009.
3 *Dow H734-52RNA Polypropylene Resin Material Safety Data Sheet*, The Dow Chemical Company, October, 3, 2008, page 4.
4 *Dow H734-52RNA Polypropylene Resin Material Safety Data Sheet*, The Dow Chemical Company, October, 3, 2008, pages 2 and 3–4.
5 *Dow H734-52RNA Polypropylene Resin Material Safety Data Sheet*, The Dow Chemical Company, October, 3, 2008, page 4.
6 Borruso, Andrea, "Polypropylene Resins," *Marketing Research Report: Chemical Economics Handbook,* SRI Consulting, September 2007, pages 6, 9, 37–38, 42, and 73.
7 The British Plastics Foundation website: About the Industry, Plastics Materials, Polypropylene. (http://www.bpf.co.uk/Plastipedia/Polymers/PP.aspx), accessed June 11, 2009.
8 The British Plastics Foundation website: About the Industry, Plastics Materials, Polypropylene. (http://www.bpf.co.uk/Plastipedia/Polymers/PP.aspx), accessed June 11, 2009.
9 Dow Polypropylene Resins web site: (http://plastics.dow.com/plastics/na/prod/polypropylene/poly_resins.htm).
10 Dow INSPIRE™ Performance Polymers web site: (http://plastics.dow.com/plastics/na/prod/polypropylene/inspire.htm).
11 The British Plastics Foundation website: About the Industry, Plastics Materials, Polypropylene. (http://www.bpf.co.uk/Plastipedia/Polymers/PP.aspx), accessed June 11, 2009.
12 Borruso, Andrea, "Polypropylene Resins," *Marketing Research Report: Chemical Economics Handbook,* SRI Consulting, September 2007, page 8.
13 *Dow H734-52RNA Polypropylene Resin Material Safety Data Sheet*, The Dow Chemical Company, October, 3, 2008, pages 2–3.

[14] *FDA Consumer*. U.S. Food and Drug Administration, November/December 2002
[15] Plastics Division of the American Chemical Council, PlasticsInfo.org website: "Microwaving with Plastics," http://www.plasticsinfo.org/s_plasticsinfo/sec_level3_collapsed.asp?CID=656&DID=2593, accessed June 5, 2009.
[16] *Dow H734-52RNA Polypropylene Resin Material Safety Data Sheet*, The Dow Chemical Company, October, 3, 2008, pages 2 and 4.
[17] *Dow H734-52RNA Polypropylene Resin Material Safety Data Sheet*, The Dow Chemical Company, October, 3, 2008, page 5.
[18] *Dow H734-52RNA Polypropylene Resin Material Safety Data Sheet*, The Dow Chemical Company, October, 3, 2008, pages 3–4.

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