
Product Safety Assessment

C5 Dienes Crude

Product Safety Assessment documents are available at: www.dow.com/productsafety/finder/.

Select a Topic:

[Names](#)
[Product Overview](#)
[Manufacture of Product](#)
[Product Description](#)
[Product Uses](#)
[Exposure Potential](#)
[Health Information](#)
[Environmental Information](#)
[Physical Hazard Information](#)
[Regulatory Information](#)
[Additional Information](#)
[References](#)

Names

- DOW™ C5 dienes crude
- CAS No. 68956-55-8
- C5 Cut – LA
- CAS No. 68476-55-1
- C5 dienes
- Hydrocarbons, C5 unsaturated
- Pyrolysis C5s
- Hydrocarbons, C5 rich

[Back to top](#)

Product Overview

- DOW™ C5 Dienes crude is a complex mixture of C5 hydrocarbons rich in cyclopentadiene, piperylene, and isoprene. This material is a colorless liquid with a strong gasoline-like odor. It is highly volatile (evaporates quickly) and does not readily mix with water (slightly soluble). DOW C5 dienes crude is produced during the manufacture of benzene from pyrolysis gasoline (pygas). Pygas is a byproduct of ethylene production.^{1,2} For further details, see [Product Description](#).
- DOW C5 dienes crude is used as a source for cyclopentadiene, isoprene, and piperylene. These chemicals are raw materials for a broad variety of applications including production of isoprene rubber, polyester resins (cyclopentadienes), C5-based hydrocarbon resins, copolymerization elastomers, and petroleum resins (piperlenes). These polymers are further processed into products such as passenger-car tires, footwear, mechanical goods, inks, adhesives, curing agents, pesticides, and perfumes. DOW C5 dienes crude may also be used for gasoline blending.³ For further details, see [Product Uses](#).
- Worker exposure is possible during manufacturing. Occupational exposure is limited by engineering controls and personal protective equipment. Components of this material may be present in gasoline. Consumers may come into contact with this material through inhalation while filling their gas tank. Isoprene, a major component of DOW C5 dienes crude, can be found to occur naturally in the environment. Both plants and animals produce isoprene. It is a building block for chlorophyll and other metabolic compounds. Oak trees are the major emitters of isoprene in nature.⁴ For further details, see [Exposure Potential](#).
- Eye contact with this material may cause moderate irritation. Prolonged skin contact may cause skin irritation with local redness, but is unlikely to result in absorption of harmful amounts. Repeated contact may cause skin burns. C5 dienes crude is highly volatile. In confined or poorly ventilated areas, vapor can readily accumulate and cause

^{®™} Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow

unconsciousness or death. Inhalation may irritate the respiratory tract (nose and throat). This material is an aspiration hazard and a cancer hazard.¹ For further details, see [Health Information](#).

- C5 dienes crude is a blend of components. The major components of the C5 dienes crude are expected to biodegrade under environment conditions. The components of this material have a low bioconcentration potential (tendency to accumulate in the food chain), and this material is toxic to fish and other aquatic organisms.⁴ For further details, see [Environmental Information](#).
- C5 dienes crude is a vapor explosion hazard. Both the liquid and vapor are extremely flammable. The vapor is heavier than air and can travel a long distance; ignition or flashback could occur. This material is stable under recommended storage conditions, but can decompose at elevated temperatures. Elevated temperatures can cause hazardous polymerization. Avoid contact with oxidizing materials.¹ For further details, see [Physical Hazard Information](#).

[Back to top](#)

Manufacture of Product^{4,3}

- **Capacity** – An estimated 2,903 metric kilotonnes (6.4 billion pounds) of C5 noncyclic category chemicals were produced globally in 2004. This total includes 10 different production streams, including the pyrolysis C5s stream (also called C5 dienes crude). The pyrolysis C5s stream is the major component in this category. Dow produces C5 dienes crude at facilities in Plaquemine Louisiana, USA and Terneuzen, The Netherlands.
- **Process** – DOW™ C5 dienes crude originates from the high-temperature cracking of petroleum fractions and is separated from pyrolysis gasoline (pygas) by distillation during the production of benzene. “Cracking” is the process in which hydrocarbon molecules are broken up into smaller molecules at very high temperature and then separated by distillation at a lower temperature.

[Back to top](#)

Product Description^{1,2}

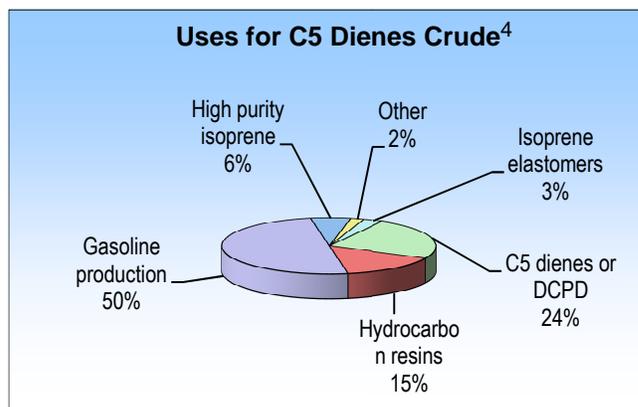
C5 dienes crude is a complex mixture of mainly unsaturated C5 hydrocarbon compounds with similar boiling points. It is also called a C5 stream, Crude C5, C5 cut, or pyrolysis C5s because it is a distillation fraction. DOW™ C5 dienes crude is a co-product in the production of benzene from pyrolysis gasoline. It is a clear to slightly yellow-colored liquid with a strong, gasoline-like odor. It is highly volatile (evaporates quickly) and does not readily mix with water (slightly soluble). DOW C5 dienes crude mainly consists of cyclopentadiene (8–19%), cis/trans pentadiene also called piperylene (10–20%), and isoprene (14–18%). There are numerous minor components with concentrations ranging from less than 6% to parts per million (ppm).

[Back to top](#)

Product Uses^{2, 3,4}

C5 dienes crude is mainly used as a source of cyclopentadiene, isoprene, and piperylene for further processing:

- **Cyclopentadiene (and its dimer dicyclopentadiene)** – raw materials for various polymerizations to produce polyester and other resins



[®]™ Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow

- **Isoprene** – a monomer used to produce polyisoprene, a synthetic rubber
- **Piperlyenes** – raw material used to produce C5-based hydrocarbon resins

Resins produced from C5 dienes crude are used to make the following consumer products:

- **Polyester resins** – fabric, carpeting, polyethylene terephthalate (PET) plastic beverage bottles (most convenience-size beverage bottles in the U.S. are made from this)
- **Polyisoprene** – car tires, footwear, mechanical goods, sealants, caulking compounds
- **C5-based hydrocarbon resins** – inks, adhesives

C5 dienes crude can also be used as a gasoline blendstock for motor fuels.

[Back to top](#)

Exposure Potential^{1,4}

DOW™ C5 dienes crude is used in the production of industrial and consumer products. Based on the uses for this material, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a benzene production facility or in the various industrial or manufacturing facilities that use C5 dienes crude. It is produced, stored, and transported in closed, pressurized systems and therefore direct worker contact is minimal. Those working with C5 dienes crude in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each manufacturing facility should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit unnecessary exposure. See [Health Information](#).
- **Consumer exposure to products containing C5 dienes crude** – Dow does not sell C5 dienes crude for direct consumer use. It is used as a raw material to make polymer resins, which are further processed into a broad variety of products. C5 dienes crude is also blended into gasoline; consumers could come into contact with this material while pumping gasoline. Isoprene, a major component of C5 dienes crude, occurs naturally in the environment at low concentrations. Isoprene is produced by plants (primarily oak trees) and animals and is a major metabolic building block. The general population is exposed to trace levels of this chemical through inhalation of ambient air. 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. C5 dienes crude is considered toxic to aquatic organisms on an acute basis and may cause long-term adverse effects in the aquatic environment. The high vapor pressure and low solubility in water make this material tend to accumulate (partition) into the air, which creates an inhalation risk. See [Environmental, Health, and Physical Hazard Information](#).
- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, ventilate the area. Evacuate personnel upwind out of low-lying areas. This material is a vapor explosion hazard. Vapors are heavier than air and can travel long distances and accumulate in low-lying areas. Only trained and properly protected personnel must be involved in clean-up operations. Contain spilled material if possible. Use foam to smother or suppress vapors. Ground and bond all containers and handling equipment. Eliminate all sources of ignition in the vicinity of the spill or released vapor. Pump recovered material with explosion-proof equipment and collect in suitable and properly labeled containers. Use appropriate safety equipment. Warn public of downwind explosion hazard. See [Environmental, Health, and Physical Hazard Information](#).
- **In case of fire** – Keep people away. Isolate fire and deny unnecessary entry. Use water fog or fine spray, dry-chemical or carbon-dioxide (CO₂) extinguishers, or foam to fight the fire. General-purpose synthetic foams (including AFFF type) or protein foams are preferred. Do not use a direct water stream; it may spread the fire. Firefighters must wear positive pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Avoid accumulation of water. Product may be carried across the water surface, spreading fire or

[®]™ Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow

contacting an ignition source. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Follow emergency procedures carefully. See [Environmental](#), [Health](#), and [Physical Hazard Information](#).

For more information, see the relevant [Safety Data Sheet](#).

[Back to top](#)

Health Information¹

Eye contact – Eye contact with liquid C5 dienes crude may cause moderate irritation. Vapors may cause eye irritation experienced as mild discomfort or redness.

Skin contact – Prolonged skin contact with this material may cause irritation with local redness. Repeated contact may cause skin burns and dry or flaking skin. Symptoms may include pain, severe local redness, swelling, and tissue damage. Prolonged skin contact is unlikely to result in absorption of harmful amounts.

Inhalation – In confined or poorly ventilated areas, vapor can readily accumulate and cause unconsciousness and death. Inhalation may cause respiratory tract irritation. Signs and symptoms of excessive inhalation may include anesthetic or narcotic effects, increased sensitivity to epinephrine, and an increased possibility for irregular heartbeats (myocardial irritability).

Ingestion – This material has low toxicity if swallowed. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. Aspiration into the lungs may occur during ingestion or vomiting, causing lung damage or even death due to chemical pneumonia.

Repeated exposure – In animal testing, repeated overexposure to this material has been reported to affect bone marrow, spleen, central nervous system, kidneys, liver, lungs, ovaries, and testes.

Other – Isoprene is classified as an anticipated carcinogen (NTP classification). Butadiene is classified as a known carcinogen (NTP). Benzene is classified as a known carcinogen (NTP). Both Benzene and Butadiene are present in C5 dienes crude in very low amounts (less than 2%).

For more information, see the relevant [Safety Data Sheet](#).

[Back to top](#)

Environmental Information^{1,4}

The components of C5 dienes crude are volatile and poorly soluble in water. If released to water, most of the components will have a tendency to evaporate. Upon release to air, the compound will rapidly degrade from reaction with hydroxyl radicals. Some of the components of C5 dienes crude are expected to be mobile in soil, and have the potential to reach underground water supplies.

DOW C5 dienes crude is not expected to persist in the environment. The components are expected to biodegrade under environment conditions.

C5 dienes crude shows a low potential for bioconcentration (tendency to accumulate in the food chain), and it is toxic to aquatic organisms on an acute basis.

For more information, see the relevant [Safety Data Sheet](#).

[Back to top](#)

[®]™ Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow

Physical Hazard Information¹

DOW™ C5 dienes crude is a vapor explosion hazard. Both the liquid and vapor are extremely flammable. The vapor is heavier than air and can travel a long distance; ignition or flashback could occur. Avoid static discharge. This material is stable under recommended storage conditions, but can decompose at elevated temperatures. Elevated temperatures can cause hazardous polymerization. Polymerization can result in the build-up of heat and/or pressure in closed systems.

Avoid contact with oxidizing materials.

For more information, see the relevant [Safety Data Sheet](#).

[Back to top](#)

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of DOW™ C5 dienes crude. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant [Safety Data Sheet](#), [Product Data Sheet](#), or [Contact Us](#).

[Back to top](#)

Additional Information

- Safety Data Sheet (www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (<http://www.dow.com/hydrocarbons/aromatics/contact/>)
- C5 Dienes Crude, Europe and US (<http://www.dow.com/hydrocarbons/aromatics/prod/products.htm>)
- C-5 Dienes Crude, Product Data Sheet, The Dow Chemical Company, Form No. 778-01801 (<http://www.dow.com/hydrocarbons/aromatics/prod/products.htm>)
- Category Summary for C5 Non-Cyclics Category, U.S. High Production Volume Chemical Program, American Chemistry Council Olefins Panel, December 13, 2004 (www.epa.gov/hpv/pubs/summaries/c5ncyl/c12801rt3.pdf)

For more business information about DOW™ C5 dienes crude, visit the [Dow Aromatics Co-Products](#) web site at <http://www.dow.com/hydrocarbons/aromatics/company/>.

[Back to top](#)

References

- ¹ C5 Cut – LA Material Safety Data Sheet, The Dow Chemical Company
- ² C-5 Dienes Crude, Product Data Sheet, The Dow Chemical Company, Form No. 778-01801
- ³ Dow Aromatics Co-Products website – C5 Dienes Crude, U.S., <http://www.dow.com/hydrocarbons/aromatics/prod/products.htm>
- ⁴ Category Summary for C5 Non-Cyclics Category, U.S. High Production Volume Chemical Program, American Chemistry Council Olefins Panel

®™ Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow

[Back to top](#)

NOTICES:

As part of its 2015 Sustainability Goals, Dow has committed to make publicly available safety assessments for its products globally. This product safety assessment is intended to give general information about the chemical (or categories of chemicals) addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the relevant Safety Data Sheet, which should be consulted before use of the chemical. This product safety assessment does not replace required communication documents such as the Safety Data Sheet.

The information herein is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Dow be responsible for damages of any nature whatsoever resulting from the use of or reliance upon the information herein or the product to which that information refers.

Nothing contained herein is to be construed as a recommendation to use any product, process, equipment or formulation in conflict with any patent, and Dow makes no representation or warranty, express or implied, that the use thereof will not infringe any patent.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.

Dow makes no commitment to update or correct any information that appears on the Internet or on its World-Wide Web server. The information contained in this document is supplemental to the Internet Disclaimer, <http://www.dow.com/homepage/term.htm>.

[Back to top](#)

Form No. 233-00441-MM-814X



®™ Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow
