



SASOL

Product Stewardship Summary

BHT (Butylated Hydroxy Toluene)

Introduction:

Butylated Hydroxy Toluene (BHT) is a manufactured antioxidant (preservative) commonly used in plastics, rubber, petroleum products, foods, pharmaceuticals, and cosmetics.



Effective and safe in a great variety of hydrocarbon products, BHT, which was patented in 1947, is the most prevalent and approved antioxidant in the world. BHT has been approved for use in foods and food packaging in low concentrations by the Food and Drug Administration (FDA) since 1954. As an antioxidant, BHT preserves organic materials by reducing the effects of time, heat and light.



BHT is generally manufactured by reacting para-cresol and iso-butylene in the presence of an acid catalyst.

Sasol BHT is used predominantly by other chemical manufacturers and industrial users that incorporate it into a multitude of products to extend the life of the materials being produced. This preservative effect benefits end consumers through longer lasting goods. The typical American uses countless products which involve BHT somewhere in their manufacture.

Chemical Identity:

Butylated Hydroxy Toluene (BHT)

2,6-di-tert-butyl-p-cresol (DBPC)

2,6-di-tert-butyl-4-methyl-phenol

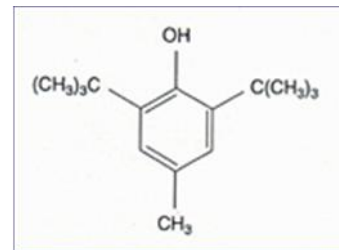
$C_6H_2(C_4H_9)_2(CH_3)OH$

$C_{15}H_{24}O$

Molecular Weight: 220.34

CAS# 128-37-0

EINECS (EU) 204-88-14



Uses:

Some common uses of BHT include:

- **Plastics**—Comprising over 65% of the worldwide application of BHT, plastics require the BHT antioxidant to stabilize the polymer during processing and protect it throughout the service life of the finished product. It is recognized as safe and is approved for use in plastic food containers and wrappings.
- **Rubbers & Elastomers**—BHT is a non-staining, non-discoloring antioxidant and is used in conjunction with other antioxidants in white and light-colored rubber products.
- **Lubricating & Specialty Oils**—BHT is an effective stabilizer and antioxidant for synthetic oils and fluids such as cutting, spindle, hydraulic and slushing oils, transformer oils, transmission fluids, and brake fluids.
- **Industrial Fats, Oils & Fatty Acids**—BHT prevents the development of rancidity in animal and vegetable fats and oils.
- **Bio-Diesel Fuel Blends**—BHT is an effective antioxidant to prevent rancidity in bio-diesel fuel blends at concentrations of less than 0.1%.
- **Linseed, Soy, & Other Plant-Derived Oils**— BHT is used in various plant-derived oils as an antioxidant for industrial uses such as printing ink bases.
- **Printing Inks and Coatings**— BHT serves as an anti-skinning agent in paints and inks.

- **Food and Feed**—Food products containing fats and oils are subject to oxidation, which results in rancidity and loss of sensory appeal. BHT is effective in animal feeds as an antioxidant and is internationally recognized as a preservative in animal feeds. BHT has proven to be an excellent antioxidant in foods. Sasol's food-grade BHT meets the FDA's requirements for use in foods and food packaging and the requirements of the U.S. Department of Agriculture for use in animal feeds. Sasol BHT has been certified **Kosher** by the Union of Orthodox Jewish Congregations of America and has also been certified **Halal** by the Islamic Food Nutrition Council of America (IFANCA). BHT is also considered GRAS (generally recognized as safe) by the FDA.



Description and Properties:

BHT is a white solid at room temperature with a mild odor. When heated above its melting point, BHT is a clear liquid. Sasol produces BHT in the following forms:

- **Crystal BHT**—Composed of random crystalline shapes.
- **Free Flow BHT Crystal**—Composed of small spherical free-flowing shapes (pellets).
- **Molten BHT**—Liquid designed for large volume users (molten due to temperature).
- **BHT Blends**—In various oils.

BHT is slightly soluble in water and quite soluble in organic oils and solvents. BHT is not flammable but will burn. It is stable under recommended storage conditions. BHT dust is explosive.

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Safety & Health Information:

The primary dangers posed in handling BHT are dust explosion and irritation. BHT dust may form an explosive mixture in air and measures must be taken to prevent dust buildup and electrostatic charges.

BHT is irritating to the eyes and may cause respiratory irritation. BHT may cause nausea, vomiting, gastro-intestinal distress, and narcotic effects if ingested in large doses well above the acceptable daily intake (ADI) of 0.3 mg/kg bw/day. Liquid BHT can cause thermal burns like any hot liquid.

BHT has been tested extensively for toxicity and used widely for many years. It does not contain any ingredient designated as a known, probable, or suspected human carcinogen. There is a low concern for reproductive or developmental toxic effects.

The levels of BHT that consumers are exposed to through food and contact with BHT containing products are not known to have any negative health effects.

Health Effects Summary:

Effect Assessment	Result
Acute Toxicity	Considered of low toxicity by oral, dermal, and inhalation routes of exposure. May cause drowsiness or dizziness.
Irritation / corrosion	Not irritant to the skin. Causes eye irritation. May cause respiratory irritation.
Sensitization	Not sensitizing.

Health Effects Summary (continued):

Effect Assessment	Result
Toxicity after repeated exposure	Based on available data no classification is required.
Toxicity after single exposure	May cause nausea, vomiting, gastro-intestinal distress, and narcotic effects if ingested in large doses well above the acceptable daily intake (ADI) of 0.3 mg/kg bw/day
Genotoxicity / mutagenicity	Not mutagenic.
Carcinogenicity	Not considered as carcinogenic.
Toxicity for reproduction	Available data do not indicate reproductive toxicity potential.

Environmental Information:

BHT has been classified as “very toxic to aquatic life with long lasting effects” due to immobilization of water fleas at the limits of water solubility. BHT is not generally considered toxic to fish at the limits of water solubility. BHT is not readily degradable in the environment and may bio-accumulate in aquatic organisms, so care must be taken to prevent it from entering surface or ground waters. BHT should be disposed of in accordance with applicable federal, state, and local regulations as a non-hazardous waste.

BHT is directly incorporated into products at low levels and does not readily leach or evaporate from preserved materials. Therefore, BHT once incorporated into products essentially has no environmental impact beyond those posed by the products themselves.

Environmental Effects Summary:

Effect Assessment	Result
Aquatic Toxicity	Very toxic to aquatic life with long lasting effects.



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Environmental Fate Summary:

Fate and Behavior	Result
Biodegradation	Not readily biodegradable.
Bioaccumulation potential	Moderate potential for bioaccumulation.
Mobility	Will adsorb to soil and sediments. The product evaporates slowly. Product will evaporate more rapidly from water.

Exposure Potential:

Because BHT is an irritant, it is regulated as a hazardous material. It is primarily used by other chemical manufacturers; therefore, chemical and transportation workers have the highest risk of exposure. Sasol does not sell BHT for direct consumer use.

Consumer exposure of BHT is low because BHT is bound directly into products such as plastic and rubber and is used at parts-per-million (ppm) levels in foods and food packaging. Consumers should always consult product labels for hazard and safe handling information.

Risk Management:

BHT can be stored, transferred, processed and disposed of safely when proper procedures and safeguards are employed in industrial use. BHT production is carried out in equipment designed to prevent exposure to workers and release to the environment. Tanks, piping, pumps, and other processing equipment are specified for handling of BHT. Secondary containment around storage tanks, process air combustion, dust collectors, and other means are used to further protect people and the environment.

Good housekeeping, dust collection at machinery, exhaust ventilation, proper grounding of equipment, humidification of use areas, inert gas blanketing, and fire suppression systems are also used to reduce the risk of fires and explosions.

Personal protective equipment such as chemical resistant suits, gloves, goggles, face shields, and respirators must be worn when handling or transferring BHT as dictated by the extent of

potential exposure. Bags, drums, and tank trucks are inspected prior to and after loading to ensure that no product is released. Carriers are approved and their performance reviewed as part of our procedures. Sasol utilizes Chemtrec® and the National Chemical Emergency Centre (NCEC) as 24 hour contact numbers to provide emergency response information to transportation workers and first responders in the case of an accident en route.

Access to the production facility is restricted to employees, and approved contractors and visitors.



Safety data sheets (SDS) for each product and practical safe handling information are provided to our customers and carriers so that they are able to use and transport our products safely. These documents include hazard information, chemical and physical properties, recommended storage conditions and personal protective equipment, firefighting and first aid information, accidental release measures, exposure guidelines and other regulatory information. Please refer to these documents for additional details.

Regulatory Information:

BHT is classified as hazardous for workers and by some modes of transport. It is regulated under a variety of local, state, federal and international laws requiring exposure and environmental controls, as well as various means of hazard communication such as labeling and SDS. BHT has been registered under REACH (CE) 1907/2006

Classification and labelling

Under GHS, substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels

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and the SDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use. The following classification and labelling information is based on the US Occupational Safety and Health Administration (OSHA) Hazard Communication Standard. Other regional classification and labelling information, such as substances registered for REACH in the European Union (EU), may differ from the US classification and labelling information.

Classification

- Serious eye damage/eye irritation Category 2B
- Specific target organ systemic toxicity (single exposure) Category 3
- Acute aquatic toxicity Category 1
- Chronic aquatic toxicity Category 1

Labelling

Signal word: Warning

Hazard pictograms:



Hazard statements:

- H320: Causes eye irritation
- H335: May cause respiratory irritation
- H336: May cause drowsiness or dizziness
- H410: Very toxic to aquatic life with long lasting effects.
- May form combustible dust concentrations in air (during processing)

Precautionary statements:

- P280 - Wear eye protection/face protection
- P264 - Wash face, hands and any exposed skin thoroughly after handling
- P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

P337 + P313 - If eye irritation persists: Get medical advice/ attention
 P261 - Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray
 P271 - Use only outdoors or in a well-ventilated area
 P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing
 P304 + P312 - IF INHALED: Call a POISON CENTER or doctor/ physician if you feel unwell
 P403 + P233 - Store in a well-ventilated place. Keep container tightly closed
 P273 - Avoid release to the environment.
 P391 - Collect spillage.
 P501 - Dispose of contents/ container to an approved waste disposal plant.

Combustible dust clouds may be created where operations produce fine material (dust). Avoid significant deposits of material, especially on horizontal surfaces, which may become airborne and form combustible dust clouds and may contribute to secondary explosions. Handling and processing operations should be conducted in accordance with 'best practices' (e.g. NFPA- 654).

Product Stewardship:

Sasol is committed to the safe manufacture, handling and distribution of our products. We incorporate product stewardship into our operating and business decisions. We actively communicate our product stewardship expectations to new and existing customers and distributors. Our procedures require evaluation of potential customers with regard to the suitability of the proposed use and the safe handling systems in place prior to establishing a supply relationship. We conduct audits of customers, warehouses, and carriers as appropriate. We perform an annual product risk review, including all customers and shipping locations, to identify actions we can take to further minimize risk with regard to distribution and use of cresylic acids. Progress is tracked in implementing the identified actions. Results of this review are communicated throughout the organization so that employees are aware of the specific ways in which we meet our commitment to product stewardship and how they can support the effort.

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We provide SDS and safe handling information to customers. We welcome questions and open communication with customers regarding practical handling and safety practices for our products. Our safety & health, operations, maintenance and technical service personnel are ready resources for customers and others involved in using or transporting our products.



Conclusion:

BHT is an important additive for products that consumers use every day at home, in travel, and in the workplace. It has a long history of helping make our lives more comfortable, safe, productive and healthy. BHT is regulated for public safety and measures are in place for its safe manufacture, storage, distribution and use.

For Further Information:

E-mail address	usasales@sasol.com
ICCA portal for additional information	http://www.icca-chem.org/en/Home/Global-Product-Strategy/

Glossary:

Acute toxicity Harmful effect resulting from a single or short term exposure to a substance.

Biodegradation	Decomposition or breakdown of a substance under natural conditions (action of microorganisms etc.).	Reprotoxicity	competitiveness of the EU chemicals industry. Including teratogenicity, embryotoxicity and harmful effects on fertility.
Bioaccumulation	Progressive accumulation in living organisms of a chemical substance present in the environment.	Sensitizing Sediment	Allergenic Topsoil, sand and minerals washed from land into water forming in the end a layer at the bottom of rivers and sea.
Carcinogenicity	Substance effects causing cancer.	Teratogenic	Substance effect on fetal morphology.
Chronic toxicity	Harmful effect after repeated exposures or long term exposure to a substance.	Vapor pressure	A measure of a substance's property to evaporate.
Clastogenicity	Substance effect that causes breaks in chromosomes.	Volatile	Any substance that evaporates readily.
Embryotoxicity	Harmful effect on fetal health.		
Flash point	The lowest temperature at which vapor of the substance may form an ignitable mixture with air.	Date of Issue:	October 20, 2016
Genotoxicity	Substance effect that causes damage to genes, including mutagenicity and clastogenicity.	Revision:	3
GHS	Global Harmonized System on Classification and Labelling of chemicals.	References:	Sasol BHT Brochure Sasol Safety Data Sheet OECD SIDS BHT, March 2002
Hazard	Inherent substance property bearing a threat to health or environment.	Disclaimer:	<i>This product stewardship summary 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 chemical's applicable Safety Data Sheet which should be consulted before use of the chemical. The product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.</i>
Mutagenicity	Substance effect that cause mutation on genes.		
Persistence	Refers to the length of time a compound stays in the environment, once introduced.		
REACH	REACH stands for Registration, Evaluation, Authorisation and Restriction of Chemicals. REACH is a regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the		<i>Nothing contained herein is to be construed as a recommendation to use any product, process, equipment or formulation in conflict with any patent, and Sasol makes no representation or warranty, express or implied, that the use thereof will not infringe any patent.</i>