

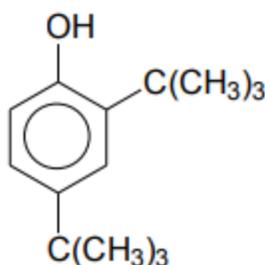
Product Safety Summary

2,4-di-tert-butylphenol (2,4-DTBP)

This product safety summary is intended to provide a general overview of the chemical substance. The information on the Summary is basic information and is not intended to provide emergency response information or information on medical treatment. Additional information on this substance is available on its Safety Data Sheet (SDS), and the SDS should be consulted prior to using the chemical.

1) Chemical Identity

IUPAC Name:	Phenol, 2,4-bis-(1,1-dimethylethyl)-
Abbreviation:	2,4-DTBP
Common Names:	2,4-di-tert-butylphenol
CAS Number:	96-76-4
EINECS Number:	202-532-0



2) Product Overview

2,4-di-tert-butylphenol has the chemical formula $C_{14}H_{22}O$. It is a white crystalline solid at room temperature and is typically sold in liquid form in 180 kg drums. 2,4-DTBP may also be sold in tank trucks or rail cars. In this form, the product must be heated to 150-170 °F (65-75 °C) to assure that its viscosity has been reduced prior to offloading into storage facilities via pipeline.

2,4-DTBP is a chemical intermediate which is exclusively marketed to other professional chemical companies for the purpose of acting as an intermediate raw material to be transformed into other chemical products. 2,4-DTBP has no direct applications in its own right and is not intended as a direct component of any consumer product.

3) The main end uses for 2,4-DTBP include:

- As a chemical intermediate for the synthesis of UV stabilizers or antioxidants
- As a chemical intermediate for the synthesis of other chemical intermediates

4) Physical properties

- Physical state / appearance at 77 °F (25 °C) white to pale yellow crystals
- Odor weak aromatic
- Density 0.908 g/cm³ @ 68 °F (20 °C)
- Solubility in water (bulk) 33 mg/L @ 77 °F (25 °C)
- Vapor pressure 5 Pa @ 100 °F (38 °C)
- Melting point 134 °F (56.8 °C)
- Boiling point 507 °F (264 °C) @ 1013 hPa
- Flash point (Tag closed cup) 266 °F (130 °C)
- Self-ignition temperature 662 °F (350 °C)
- Log K_{ow} 4.8 @ 73 °F (23 °C)
- Molecular weight 206.32 g/mol

5) Health Information

2,4-DTBP caused the following effects in animal studies:

- A low concern for acute toxicity by the oral or dermal route of exposure; signs of toxicity and mortality occur at high dose levels that are much greater than typical human exposure
- Irritating to skin and eyes.
- Not a skin sensitizer
- Not mutagenic in vitro or clastogenic (Micronucleus study in vivo)
- A low concern for carcinogenicity by genotoxic and non-genotoxic mechanisms
- A no observed adverse effect level (NOAEL) of 15 mg/kg body weight/day was concluded from a 28-day oral toxicity study in rats on a structurally related substance (OECD Guideline 407)

Species	End Point	Results
Rat	Acute Oral Toxicity	LD50 > 2000 mg/kg
Rabbit	Eye Irritation	Irritating
Rabbit	Skin Irritation	Irritating

6) Environmental Effects

2,4-DTBP is very toxic to aquatic organisms. Special care should be taken to assure that 2,4-DTBP or mixtures containing 2,4-DTBP do not enter the aquatic environment.

Species	Results
Fish (Fathead minnow), 96-hr	LC50 = > 0.1 mg/L
Daphnia magna, 48-hr	EC50 = 0.5 mg/L
Algae (<i>Desmodesmus subspicatus</i>), 72-hr	EC50 = 0.37 mg/L

Environmental Fate

It is not readily biodegradable. BCF determined in a flow through study was 436 L/kg. 2,4-DTBP is photolytically degradable. In the atmospheric compartment its half-life is estimated at 2.6 hours.

7) Exposure Potential

Manufacturing

The manufacture of 2,4-DTBP is conducted in a batch process via the catalyzed reaction of phenol and isobutylene. After recycle streams are taken into account, all reactants are essentially 100% utilized and converted to product. The chemical reactions are carried out in closed reactors under strictly controlled conditions aided by modern process control computers. Raw materials are added by dedicated pipelines so that there is no worker exposure or environmental release during the process. Chemical operators oversee the reaction conditions in the manufacturing plants. These individuals are highly trained in chemical processing and handling as well as in the correct use of safety equipment and engineering controls. It is customary for chemical operators who may handle 2,4-DTBP use personal protection equipment that includes coveralls, long sleeve shirts, work shoes with protective coverings, eye and face protection, chemical resistant gloves and hardhats.

Finished products are isolated by distillation and are handled in a closed system of pipes and dedicated storage tanks. There is no opportunity for dermal or inhalation exposure during the product transfer process.

Reaction products are monitored for quality assurance (QA) using aliquots of the vessel contents collected from controlled sampling spigots that precludes aerosol formation, splashing or spillage due to overflow. Samples analysed in the QA lab are handled using good laboratory safety practices. No exposure to 2,4-DTBP is expected during the sampling or analytical processes.

Maintenance worker exposure to 2,4-DTBP during cleaning operations for storage vessels or shipping tanks is eliminated when proper engineering controls and required personal protective equipment are in use. Railcars and tank trucks are typically steam cleaned in an automated fashion. Workers complete the cleaning of these enclosures while wearing suitable personal protective equipment that includes chemical suits and respirators designed to protect against exposure.

Packaged Products

Protection from exposure to liquid, vapor or mist from manufacturing operations is accomplished via engineering controls in the production area. Dermal or inhalation exposure to liquid, vapor or mist from 2,4-DTBP by downstream users should be avoided. Consult the relevant SDS for specific handling and packaging disposal precautions.

Consumer Products

2,4-DTBP has no direct application in consumer products and is sold only to chemical companies for use as a chemical intermediate which is transformed into other substances.

8) Risk Management Recommendations

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Ventilation should be sufficient to effectively remove, and prevent build-up of, any vapors or fumes that may be generated during handling or thermal processing. In order to ensure appropriate electrical safety practices are followed, consult applicable standards. These may include guidelines such as the National Fire Protection Association [NFPA] 70, "The National Electrical Code" and NFPA 499, "Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas".

NOTE: since this material's vapors or fumes can form explosive mixtures in air, ensure that any potential areas where explosions may occur are designed to minimize potential damage. For recommendations to prevent such explosions and associated damage, consult applicable guidelines such as NFPA 69, "Standard on Explosion Prevention Systems" and/or NFPA 68, "Guide for Venting Deflagrations". Keep working clothes separately and do not take them home.

9) State Agency Review

2,4-DTBP has been registered under REACH Regulation (EC) 1907/2006. Detail information on registration dossier is available on ECHA homepage with search criteria "96-76-4":

<http://echa.europa.eu/en/information-on-chemicals/registered-substances>

10) Regulatory Information, Classification and Labelling

GHS classification of 2,4-DTBP according CLP (CE) 1272/2008:

Skin corrosion - Category 2 H315 Causes skin irritation.

Eye corrosion - Category 1B H318 Causes serious eye damage.

Chronic aquatic toxicity - Category 1 H410 Very toxic to aquatic life with long lasting effects.

Signal Word - Danger



11) Contact Information within Company

For further information, please contact your sales representative.