

OCCUPATIONAL SAFETY AND HEALTH GUIDELINE

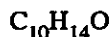
FOR o-sec-BUTYLPHENOL

INTRODUCTION

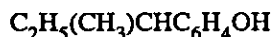
This guideline summarizes pertinent information about o-sec-butylphenol for workers and employers as well as for physicians, industrial hygienists, and other occupational safety and health professionals who may need such information to conduct effective occupational safety and health programs. Recommendations may be superseded by new developments; readers are therefore advised to regard these recommendations as general guidelines and to determine periodically whether new information is available.

SUBSTANCE IDENTIFICATION

• Formula



• Structure



• Synonyms

2-(1-Methylpropyl)phenol; 2-sec-butylphenol

• Identifiers

1. CAS No.: 89-72-5
2. RTECS No.: SJ8920000
3. DOT UN: 2228 53
4. DOT label: St. Andrew's Cross

• Appearance and odor

o-sec-Butylphenol is a colorless, slightly volatile, combustible liquid.

CHEMICAL AND PHYSICAL PROPERTIES

• Physical data

1. Molecular weight: 150.2
2. Boiling point (760 mm Hg): 226° to 228°C (438.8° to 442°F)

3. Specific gravity (water = 1): 0.98 at 20°C (68°F)
4. Vapor density: Data not available
5. Melting point: 16°C (60.9°F)
6. Vapor pressure at 20°C (68°F): Data not available; however, o-sec-butylphenol is reported to be slightly volatile.
7. Solubility: Insoluble in water; soluble in alcohol, ether, and alkalis
8. Evaporation rate: Data not available

• Reactivity

1. Conditions contributing to instability: Heat, sparks, and open flame
2. Incompatibilities: None known
3. Hazardous decomposition products: Toxic gases may be released in a fire involving o-sec-butylphenol.
4. Special precautions: None known

• Flammability

The National Fire Protection Association has not assigned a flammability rating to o-sec-butylphenol; other sources report that this substance is combustible but does not ignite readily.

1. Flash point: 107.2°C (225°F)
2. Autoignition temperature: Data not available
3. Flammable limits in air: Data not available
4. Extinguishant: Use dry chemical, carbon dioxide, water spray, or alcohol to fight fires involving o-sec-butylphenol.

Fires involving o-sec-butylphenol should be fought upwind and from the maximum distance possible. Isolate the hazard area and deny access to unnecessary personnel. Emergency personnel should stay out of low areas and ventilate closed spaces before entering. Containers of o-sec-butylphenol may explode in the heat of the fire and should be moved from the fire area if it is possible to do so safely. If this is not

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possible, cool containers from the sides with water until well after the fire is out. Stay away from the ends of containers. Personnel should withdraw immediately if they hear a rising sound from a venting safety device or if a container becomes discolored as a result of fire. Dikes should be used to contain fire-control water for later disposal. If a tank car or truck is involved in a fire, personnel should isolate an area of a half mile in all directions. Firefighters should wear a full set of protective clothing (including a self-contained breathing apparatus) when fighting fires involving o-sec-butylphenol. Chemical protective clothing that is specifically recommended for o-sec-butylphenol may not provide thermal protection unless so stated by the clothing manufacturer. Firefighters' protective clothing may not provide protection against permeation by o-sec-butylphenol.

EXPOSURE LIMITS

• OSHA PEL

The current Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) for o-sec-butylphenol is 5 ppm (30 mg/m³) as an 8-hr time-weighted average (TWA) concentration. The OSHA PEL also bears a "Skin" notation, which indicates that the cutaneous route of exposure (including mucous membranes and eyes) contributes to overall exposure [29 CFR 1910.1000, Table Z-1-A].

• NIOSH REL

The National Institute for Occupational Safety and Health (NIOSH) has established a recommended exposure limit (REL) of 5 ppm (30 mg/m³) as an 8-hr TWA with a "Skin" notation [NIOSH 1992].

• ACGIH TLV[®]

The American Conference of Governmental Industrial Hygienists (ACGIH) has assigned o-sec-butylphenol a threshold limit value (TLV) of 5 ppm (31 mg/m³) as a TWA for a normal 8-hr workday and a 40-hr workweek. The ACGIH also assigns a "Skin" notation to o-sec-butylphenol [ACGIH 1991b].

• Rationale for limits

The limits are based on the risk of eye and respiratory irritation and skin burns associated with exposure to o-sec-butylphenol.

HEALTH HAZARD INFORMATION

• Routes of exposure

Exposure to o-sec-butylphenol can occur through inhalation, ingestion, and eye or skin contact.

• Summary of toxicology

1. *Effects on Animals:* o-sec-Butylphenol is an irritant of the eyes, skin, and upper respiratory tract. Application of 0.05 mg of o-sec-butylphenol to the eyes of rabbits caused severe injury [NIOSH 1991; ACGIH 1991a]. When applied to the skin of rabbits for 24 hr, 500 mg caused severe burns [ACGIH 1991a; NIOSH 1991]. The dermal LD₅₀ in guinea pigs is 600 mg/kg [NIOSH 1991]. Rats survived a 7-hr exposure to an atmosphere saturated with o-sec-butylphenol vapor [ACGIH 1991a]. The oral LD₅₀ is 2,700 mg/kg in rats and 600 mg/kg in guinea pigs [NIOSH 1991]. This material was nonmutagenic when tested in five strains of *Salmonella typhimurium* [NLM 1991].

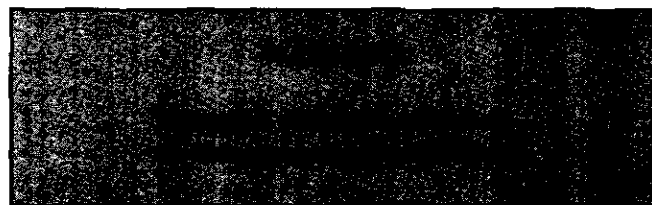
2. *Effects on Humans:* o-sec-Butylphenol is an eye, skin, and respiratory tract irritant and a potential corrosive. Acute occupational exposures to unspecified concentrations of this substance cause mild respiratory tract irritation, and prolonged skin contact results in dermal ulcerations and burns [ACGIH 1991a; NLM 1991]. Ingestion of a solution exceeding 5% o-sec-butylphenol may cause oral burns, which can become necrotic several days later [NLM 1991]. Using analogous data from other phenolic compounds, it may also cause nausea, vomiting, intense sweating, diarrhea, methemoglobinemia, tachycardia, hypotension, arrhythmias, seizures, CNS depression, hepatic injury, and death from respiratory arrest [NLM 1991].

• Signs and symptoms of exposure

1. *Acute exposure:* Acute exposure to o-sec-butylphenol can cause eye irritation, redness, and pain; irritation of the nasal and respiratory tract mucosa; scratchy throat; and redness, swelling, and chemical burns of the skin.

2. *Chronic exposure:* Other than irritation, no signs or symptoms of chronic exposure to o-sec-butylphenol have been reported.

• Emergency procedures



Keep unconscious victims warm and on their sides to avoid choking if vomiting occurs. *Immediately* initiate the following emergency procedures, continuing them as appropriate en route to the emergency medical facility:

1. *Eye exposure:* Tissue destruction and blindness may result from exposure to concentrated solutions, vapors, mists or aerosols of o-sec-butylphenol! *Immediately but gently*

flush the eyes with large amounts of water for at least 15 min, occasionally lifting the upper and lower eyelids.

2. *Skin exposure:* Severe burns, skin corrosion, and absorption of toxic amounts may result! *Immediately* remove all contaminated clothing! *Immediately, continuously, and gently* wash skin for at least 15 min. Use soap and water if skin is intact; use only water if skin is not intact.

3. *Inhalation exposure:* If vapors, mists, or aerosols of o-sec-butylphenol are inhaled, move the victim to fresh air *immediately*.

If the victim is not breathing, clean any chemical contamination from the victim's lips and perform cardiopulmonary resuscitation (CPR); if breathing is difficult, give oxygen.

4. *Ingestion exposure:* Take the following steps if o-sec-butylphenol or a solution containing it is ingested:

—Do *not* induce vomiting.

—Have the victim rinse the contaminated mouth cavity several times with a fluid such as water. Immediately after rinsing, have the victim drink one cup (8 oz) of fluid and *no more*.

—Do *not* permit the victim to drink milk or carbonated beverages!

—Do *not* permit the victim to drink any fluid if more than 60 min have passed since initial ingestion.

NOTE: These instructions must be followed exactly. Drinking a carbonated beverage or more than one cup of fluid could create enough pressure to perforate already damaged stomach tissue. The tissue-coating action of milk may impede medical assessment of tissue damage. Ingestion of any fluid more than 60 min after initial exposure could further weaken damaged tissue and result in perforation.

5. *Rescue:* Remove an incapacitated worker from further exposure and implement appropriate emergency procedures (e.g., those listed on the material safety data sheet required by OSHA's hazard communication standard [29 CFR 1910.1200]). All workers should be familiar with emergency procedures and the location and proper use of emergency equipment.

EXPOSURE SOURCES AND CONTROL METHODS

The preparation of plasticizers, resins, surface-active agents, and other products may involve o-sec-butylphenol and may result in worker exposures to this substance.

The following methods are effective in controlling worker exposures to o-sec-butylphenol, depending on the feasibility of implementation:

—Process enclosure

—Local exhaust ventilation

—General dilution ventilation

—Personal protective equipment

Good sources of information about control methods are as follows:

1. ACGIH [1992]. Industrial ventilation—a manual of recommended practice. 21st ed. Cincinnati, OH: American Conference of Governmental Industrial Hygienists.

2. Burton DJ [1986]. Industrial ventilation—a self study companion. Cincinnati, OH: American Conference of Governmental Industrial Hygienists.

3. Alden JL, Kane JM [1982]. Design of industrial ventilation systems. New York, NY: Industrial Press, Inc.

4. Wadden RA, Scheff PA [1987]. Engineering design for control of workplace hazards. New York, NY: McGraw-Hill.

5. Plog BA [1988]. Fundamentals of industrial hygiene. Chicago, IL: National Safety Council.

MEDICAL MONITORING

Workers who may be exposed to chemical hazards should be monitored in a systematic program of medical surveillance that is intended to prevent occupational injury and disease. The program should include education of employers and workers about work-related hazards, placement of workers in jobs that do not jeopardize their safety or health, early detection of adverse health effects, and referral of workers for diagnosis and treatment. The occurrence of disease or other work-related adverse health effects should prompt immediate evaluation of primary preventive measures (e.g., industrial hygiene monitoring, engineering controls, and personal protective equipment). A medical monitoring program is intended to supplement, not replace, such measures. To place workers effectively and to detect and control work-related health effects, medical evaluations should be performed (1) before job placement, (2) periodically during the term of employment, and (3) at the time of job transfer or termination.

• Preplacement medical evaluation

Before a worker is placed in a job with a potential for exposure to o-sec-butylphenol, a licensed health care professional should evaluate and document the worker's baseline health status with thorough medical, environmental, and occupational histories, a physical examination, and physiologic and laboratory tests appropriate for the anticipated occupational risks. These should concentrate on the function and integrity of the respiratory system. Medical monitoring for respiratory disease should be conducted using

the principles and methods recommended by the American Thoracic Society [ATS 1987].

A preplacement medical evaluation is recommended to assess an individual's suitability for employment at a specific job and to detect and assess medical conditions that may be aggravated or may result in increased risk when a worker is exposed to *o*-sec-butylphenol at or below the prescribed exposure limit. The licensed health care professional should consider the probable frequency, intensity, and duration of exposure as well as the nature and degree of any applicable medical condition. Such conditions (which should not be regarded as absolute contraindications to job placement) include a history and other findings consistent with respiratory system diseases.

- **Periodic medical examinations and biological monitoring**

Occupational health interviews and physical examinations should be performed at regular intervals during the employment period, as mandated by any applicable Federal, State, or local standard. Where no standard exists and the hazard is minimal, evaluations should be conducted every 3 to 5 years or as frequently as recommended by an experienced occupational health physician. Additional examinations may be necessary if a worker develops symptoms attributable to *o*-sec-butylphenol exposure. The interviews, examinations, and medical screening tests should focus on identifying the adverse effects of *o*-sec-butylphenol on the respiratory tract and skin. Current health status should be compared with the baseline health status of the individual worker or with expected values for a suitable reference population.

Biological monitoring involves sampling and analyzing body tissues or fluids to provide an index of exposure to a toxic substance or metabolite. No biological monitoring test acceptable for routine use has yet been developed for *o*-sec-butylphenol.

- **Medical examinations recommended at the time of job transfer or termination**

The medical, environmental, and occupational history interviews, the physical examination, and selected physiologic or laboratory tests that were conducted at the time of job placement should be repeated at the time of job transfer or termination. Any changes in the worker's health status should be compared with those expected for a suitable reference population.

WORKPLACE MONITORING AND MEASUREMENT

A worker's exposure to airborne *o*-sec-butylphenol is determined by using a XAD-7 tube (100/50-mg sections; 15/50 mesh). Samples are collected at a recommended flow

rate of 0.1 liter/min until a recommended air volume of 10 liters is collected. Analysis is conducted by high-performance liquid chromatography using ultraviolet light. This method is described in the OSHA Computerized Information System [OSHA 1989] and in the OSHA Laboratory In-House Methods File [OSHA 1990].

PERSONAL HYGIENE

Because *o*-sec-butylphenol can be absorbed through the skin in toxic amounts, workers should immediately and thoroughly wash with soap and water any areas of the skin that have contacted this substance.

Clothing and shoes contaminated with *o*-sec-butylphenol should be removed immediately, and provisions should be made for safely removing this chemical from these articles. Persons laundering contaminated clothing should be informed about the hazardous properties of *o*-sec-butylphenol, particularly its potential for being an irritant and for being absorbed through the skin in toxic amounts.

A worker who handles *o*-sec-butylphenol should thoroughly wash hands, forearms, and face with soap and water before eating, using tobacco products, or using toilet facilities.

Workers should not eat, drink, or use tobacco products in areas where *o*-sec-butylphenol or a solution containing it is handled, processed, or stored.

STORAGE

o-sec-Butylphenol should be stored in a cool, dry, well-ventilated area in tightly sealed containers that are labeled in accordance with OSHA's hazard communication standard [29 CFR 1910.1200]. Containers of *o*-sec-butylphenol should be protected from physical damage and should be stored separately from heat, sparks, and open flame. Because containers that formerly contained *o*-sec-butylphenol may still hold product residues, they should be handled appropriately.

SPILLS AND LEAKS

In the event of a spill or leak involving *o*-sec-butylphenol, persons not wearing protective equipment and clothing should be restricted from contaminated areas until cleanup is complete. The following steps should be undertaken following a spill or leak:

1. Do not touch the spilled material; stop the leak if it is possible to do so without risk.
2. Notify safety personnel.
3. Remove all sources of heat and ignition.
4. Ventilate the area of the spill or leak.

5. Absorb liquid spills with sand or other noncombustible absorbent material and place the material in a covered container for later disposal.

SPECIAL REQUIREMENTS

U.S. Environmental Protection Agency (EPA) requirements for emergency planning, reportable quantities of hazardous releases, community right-to-know, and hazardous waste management may change over time. Users are therefore advised to determine periodically whether new information is available.

• Emergency planning requirements

o-sec-Butylphenol is not subject to EPA emergency planning requirements under the Superfund Amendments and Reauthorization Act (SARA) [42 USC 11022].

• Reportable quantity requirements for hazardous releases

Employers are not required by the emergency release notification provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) [40 CFR 355.40] to notify the National Response Center of an accidental release of o-sec-butylphenol; there is no reportable quantity for this substance.

• Community right-to-know requirements

Employers are not required by Section 313 of SARA to submit a Toxic Chemical Release Inventory Form (Form R) to EPA reporting the amount of o-sec-butylphenol emitted or released from their facility annually.

• Hazardous waste management requirements

EPA considers a waste to be hazardous if it exhibits any of the following characteristics: ignitability, corrosivity, reactivity, or toxicity as defined in 40 CFR 261.21-261.24. Although o-sec-butylphenol is not specifically listed as a hazardous waste under the Resource Conservation and Recovery Act (RCRA) [40 USC 6901 et seq.], EPA requires employers to treat waste as hazardous if it exhibits any of the characteristics discussed above.

Providing detailed information about the removal and disposal of specific chemicals is beyond the scope of this guideline. The U.S. Department of Transportation, EPA, and State and local regulations should be followed to ensure that removal, transport, and disposal of this substance are conducted in accordance with existing regulations. To be certain that chemical waste disposal meets EPA regulatory requirements, employers should address any questions to the RCRA hotline at (800) 424-9346 or at (202) 382-3000 in Washington, D.C. In addition, relevant State and local authorities should be contacted for information about their requirements for waste removal and disposal.

RESPIRATORY PROTECTION

• Conditions for respirator use

Good industrial hygiene practice requires that engineering controls be used where feasible to reduce workplace concentrations of hazardous materials to the prescribed exposure limit. However, some situations may require the use of respirators to control exposure. Respirators must be worn if the ambient concentration of o-sec-butylphenol exceeds prescribed exposure limits. Respirators may be used (1) before engineering controls have been installed, (2) during work operations such as maintenance or repair activities that involve unknown exposures, (3) during operations that require entry into tanks or closed vessels, and (4) during emergencies. Workers should use only respirators that have been approved by NIOSH and the Mine Safety and Health Administration (MSHA).

• Respiratory protection program

Employers should institute a complete respiratory protection program that, at a minimum, complies with the requirements of OSHA's respiratory protection standard [29 CFR 1910.134]. Such a program must include respirator selection, an evaluation of the worker's ability to perform the work while wearing a respirator, the regular training of personnel, fit testing, periodic workplace monitoring, and regular respirator maintenance, inspection, and cleaning. The implementation of an adequate respiratory protection program (including selection of the correct respirator) requires that a knowledgeable person be in charge of the program and that the program be evaluated regularly. For additional information on the selection and use of respirators and on the medical screening of respirator users, consult the *NIOSH Respirator Decision Logic* [NIOSH 1987b] and the *NIOSH Guide to Industrial Respiratory Protection* [NIOSH 1987a].

PERSONAL PROTECTIVE EQUIPMENT

Protective clothing should be worn to prevent prolonged or repeated skin contact with o-sec-butylphenol. Chemical protective clothing should be selected on the basis of available performance data, manufacturers' recommendations, and evaluation of the clothing under actual conditions of use. No reports have been published on the resistance of various protective clothing materials to o-sec-butylphenol permeation. If permeability data are not readily available, protective clothing manufacturers should be requested to provide information on the best chemical protective clothing for workers to wear when they are exposed to o-sec-butylphenol.

If o-sec-butylphenol is dissolved in an organic solvent, the permeation properties of both the solvent and the mixture must be considered when selecting personal protective equipment and clothing.

Safety glasses, goggles, or face shields should be worn during operations in which *o*-sec-butylphenol might contact the eyes (e.g., through splashes of solution). Eyewash fountains and emergency showers should be available within the immediate work area whenever the potential exists for eye or skin contact with *o*-sec-butylphenol. Contact lenses should not be worn if the potential exists for *o*-sec-butylphenol exposure.

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