

SAFETY DATA SHEETS

According to the UN GHS revision 10

1: Identification

1.1 GHS Product identifier

Product name 4-Nitrophenol

1.2 Other means of identification

Product number 100-02-7

Other names 4-Nitrophenol

1.3 Recommended use of the chemical and restrictions on use

Identified uses Industrial and scientific research use.

Uses advised against no data available

1.4 Supplier's details

Company Visit molwiki.com to edit online and customize the content.

Address Visit molwiki.com to edit online and customize the content.

Telephone Visit molwiki.com to edit online and customize the content.

1.5 Emergency phone number

Emergency phone number Visit molwiki.com to edit online and customize the content.

Service hours Visit molwiki.com to edit online and customize the content.

2: Hazard identification

2.1 Emergency Overview

Highly toxic substances, even small amounts of which can cause death or serious health effects. They can enter the body through inhalation, skin contact, or ingestion. Immediate protective measures must be taken to avoid any contact.

2.2 GHS Classification

Acute toxicity, oral : Category 3

Acute toxicity, oral : Category 4

Acute toxicity, dermal; acute toxicity, inhalation : Category 4

Acute toxicity, dermal : Category 4

Acute toxicity, inhalation : Category 4

Specific target organ toxicity, repeated exposure : Category 2

Hazardous to the aquatic environment, long-term hazard : Category 3

2.3 GHS label elements, including precautionary statements

Pictogram(s)**Signal word**

Danger

Hazard statement(s)

H301 Toxic if swallowed
H302 Harmful if swallowed
H312+H332 Harmful in contact with skin or if inhaled
H312 Harmful in contact with skin
H332 Harmful if inhaled
H373 May cause damage to organs through prolonged or repeated exposure
H412 Harmful to aquatic life with long lasting effects

Precautionary statement(s)**Prevention**

P260 Do not breathe dust/fume/gas/mist/vapors/spray.
P261 Avoid breathing dust/fume/gas/mist/vapors/spray.
P264 Wash hands [and ...] thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...

Response

P317 Get emergency medical help.
P319 Get medical help if you feel unwell.
P321 Specific treatment (see ... on this label).
P330 Rinse mouth.
P301+P316 IF SWALLOWED, Get emergency medical help immediately.
P301+P317 IF SWALLOWED, Get medical help.
P302+P352 IF ON SKIN, wash with plenty of water/...
P304+P340 IF INHALED, Remove person to fresh air and keep comfortable for breathing.
P362+P364 Take off contaminated clothing and wash it before reuse.

Storage

P405 Store locked up.

Disposal

P501 Dispose of contents/container to ...

2.4 Physical and chemical

Some substances may also be flammable or corrosive. Mixing with other substances may produce toxic products. Highly volatile substances can form toxic vapor clouds, expanding the hazard range.

2.5 Health hazards

Acute toxicity, May cause respiratory failure, cardiac arrest, nervous system depression, or organ failure. Severe symptoms may appear within a short period of exposure (minutes to hours). Long-term effects may include permanent organ damage.

2.6 Environmental hazards

It is extremely toxic to aquatic organisms and terrestrial ecosystems, and even a small release can cause large-scale biological mortality. It may persist in the environment and accumulate through the food chain, causing long-term damage to ecosystems.

2.7 Other hazards which do not result in classification

no data available

3: Composition/information on ingredients

3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
4-Nitrophenol	4-Nitrophenol	100-02-7	202-811-7	99%

4: First-aid measures

4.1 General advice

Stop contact immediately and move to a safe area; bring the material SDS document and call emergency services immediately; record the route of exposure (inhalation/skin/ingestion), exposure time and dosage for the doctor's judgment.

4.2 If inhaled

Quickly transfer the patient to a place with fresh air, keep the patient lying flat with the head tilted to one side (to prevent suffocation by vomitus); if cyanosis or breathing difficulties occur, immediately give oxygen (flow rate 5-10L/min); it is strictly forbidden to feed/drink water to the unconscious person, and seek medical attention immediately.

4.3 In case of skin contact

Immediately remove contaminated clothing (if clothing is stuck to the skin, cut it with scissors to avoid tearing it). Rinse the affected area with plenty of running water for 20-30 minutes (the water temperature should be around 37°C, avoiding excessive heat or cold). If the skin is damaged, cover it with sterile gauze after rinsing. Do not apply ointment.

4.4 In case of eye contact

Immediately flush with an eyewash station for 15 minutes (open the eyelids to ensure thorough flushing of the upper and lower fornixes); wear a light-shielding eye mask after flushing to avoid strong light stimulation, and immediately seek medical attention from an ophthalmologist (bring along the substance SDS).

4.5 If swallowed

Self-induced vomiting is strictly prohibited (especially with corrosive and toxic substances, which may cause secondary burns to the esophagus). If the patient is conscious and not convulsing, they can drink 50-100ml of milk under the guidance of a doctor (to protect the gastric mucosa).

4.6 Most important symptoms and effects, both acute and delayed

Acute symptoms: nausea and vomiting, abdominal pain, dyspnea, convulsions, confusion, and decreased blood pressure; delayed symptoms: liver and kidney damage (appearing within 24-72 hours), methemoglobinemia (such as nitrite poisoning).

4.7 Protection of first-aiders

Rescuers must wear fully enclosed chemical protective clothing, a gas mask (with a targeted gas filter cartridge, such as for organic vapors and acid gases), and chemical protective gloves; avoid direct contact with the patient's vomitus/secretions, and wash hands immediately with chlorine-containing disinfectant after contact.

4.8 Notes to physician

Inform the physician of the substance's toxicity (e.g., oral LD50 = 5 mg/kg) and route of exposure; prioritize gastric lavage (physician evaluation required for appropriateness) and administer antidotes (e.g., atropine for organophosphate poisoning); monitor liver and kidney function, electrolytes, and coagulation function.

5: Fire-fighting measures

5.1 Unsuitable extinguishing media

It is strictly forbidden to use fire extinguishing agents that may cause the spread of toxic substances (such as high-pressure water jets); if flammable liquids are involved, avoid using carbon dioxide (which may cause toxic vapor condensation).

5.2 Specific hazards during fire fighting

Combustion may be accompanied by the release of highly toxic substances (such as cyanide and arsenide), which are fatal by inhalation or skin contact; the combustion of flammable components can easily cause explosions and intensify the spread of toxic substances; toxic vapors are heavier than air and tend to accumulate in low-lying areas.

5.3 Hazardous combustion products

Highly toxic gases (such as hydrogen chloride, hydrogen fluoride, phosgene), carbon monoxide, nitrogen oxides; some contain heavy metal components that release toxic fumes such as mercury and lead.

5.4 Specific extinguishing methods

For small areas: use dry powder fire extinguishing agent to extinguish the fire, and dilute the toxic vapor with mist water (avoid direct spraying); for large areas: give priority to evacuation. If fire extinguishing is necessary, set up a fire extinguishing point upwind and cover it with foam (to isolate oxygen); after extinguishing the fire, test the area for toxicity concentration (entry is allowed only when the value is below MAC).

5.5 Special protective equipment for fire-fighters

Wear fully enclosed chemical protective clothing, gas masks (with targeted gas filter boxes, such as organic vapor + acidic gas), and chemical protective gloves (made of fluororubber); carry a portable toxic gas detector; equipment must be disinfected after the operation, and personnel must undergo health monitoring.

6: Accidental release measures

6.1 Protective measures for workers

Wear fully enclosed chemical protective clothing, positive pressure air respirator, chemical protective gloves (toxic-resistant type) and goggles; avoid direct contact with the skin and wash immediately after work.

6.2 Environmental protection measure

Isolate the 30-meter contaminated area to prevent the leak from spreading through rainwater/groundwater; take samples of water/soil for testing, and use activated carbon adsorption (organic poison) or neutralizer (inorganic poison) for treatment when exceeding the standard; strictly prohibit the leak from entering the drinking water source.

6.3 Containment methods for leaked chemicals

Collect liquids in corrosion-resistant sealed containers (marked with "toxic substances"); collect solids in chemical-resistant bags (to avoid dust); and store them separately in a hazardous waste warehouse after collection, away from food/feed.

6.4 Cleanup methods for chemical spills

Small leakage: absorb with special absorbent cotton (toxic-resistant) and put into chemical-proof bag; large leakage: professionals use chemical-proof pump to transfer to special storage tank; after cleaning, treat the ground with neutralizer (weak base for acid poison and weak acid for alkali poison).

6.5 Measures to prevent the spread of leaks

Set up a 30-meter isolation zone and prohibit unauthorized personnel from entering; volatile toxic substances require explosion-proof ventilation to reduce gas concentration; use chemical defense isolation belts to block them, and focus on monitoring low-lying areas (to prevent the accumulation of toxic substances).

6.6 Container leakage treatment

Minor leaks: Seal with compatible sealant; Serious leaks: Evacuate immediately, close the upstream valve (if safe), and have the toxic material disposal team handle it. It is strictly forbidden to open the container without authorization.

6.7 Special considerations

Workers must receive poisoning first aid training and carry antidotes (if applicable). In case of skin contact, flush immediately with plenty of water for 15 minutes. In case of inhalation poisoning, move immediately to fresh air and seek medical attention.

7: Handling and storage

7.1 Safe storage conditions

Store in a closed, impermeable dedicated warehouse (the walls are made of anti-corrosion materials, such as polyethylene coating); the container is made of corrosion-resistant material (such as polytetrafluoroethylene, glass-lined steel), with a double sealing cover (threaded cover + nitrile rubber sealing ring); the warehouse is equipped with a negative pressure ventilation system (air changes ? 8 times/hour), and the exhaust gas must be treated with activated carbon adsorption (adsorption efficiency ? 95%).

7.2 Storage precautions

Store them separately from food, feed, and medicine (isolation distance ? 3 meters), and strictly prohibit them from being adjacent to drinking water sources; clearly mark "highly toxic" and H code on container labels and store them separately on locked shelves; check the sealing of containers weekly and immediately transfer them to the emergency treatment area if any leakage is found; workers must wear fully enclosed chemical protective clothing before entering the warehouse.

7.3 VCI Storage Grade

Level 1 (highest): The inner wall of the metal container is coated with a VCI anti-rust coating (thickness ? 50?m), and the outer surface of the container is wrapped with a vapor phase anti-rust film; the concentration of toxic substances in the warehouse is tested monthly to ensure that it is lower than the MAC value (for example, MAC of oral toxic substances ? 0.1mg/m³).

7.4 Recommended storage temperature

10-30?, avoid extreme temperatures (below 0? or above 35?); volatile toxic substances must be kept at a temperature ?25? to reduce vapor release; refrigerated storage substances (such as certain biotoxins) must be maintained at 2-8? and equipped with dual power supply protection (if the label has a recommended storage temperature, the label shall prevail).

7.5 Handling

For precautions see Safety Data Sheet section 2

Advice on safe handling : Work under hood. Do not inhale substance/mixture.

8: Exposure controls/personal protection

8.1 Respiratory protection

Choose according to the exposure route: volatile substances require positive pressure air respirators; dust/aerosols require powered air-purifying respirators to ensure the protection factor (APF) ? 1000.

8.2 Recommended Filter type

For organic toxic substances, choose Type A filter cartridge (to protect against organic vapors, such as benzene and methanol); for inorganic toxic substances, choose Type B (to protect against ammonia) or Type E (to protect against acidic gases, such as hydrogen chloride); for dust, add Type P3 filter cotton.

8.3 Eye/face protection

Wear a full-face chemical protective mask. The mask material must be resistant to toxic penetration (such as fluororubber), and the lens must be anti-fog and anti-chemical corrosion.

8.4 Skin and body protection

Wear fully enclosed chemical protective clothing. The material must be compatible with toxic substances (such as polyethylene + neoprene composite material); the cuffs and ankles must be tightened and equipped with emergency escape zippers.

8.5 Hand protection

Wear toxic and chemical-resistant gloves, preferably made of fluororubber or butyl rubber, with a length of ?30 cm, covering the forearm, and change every 4 hours

8.6 Hygiene measures

Immediately after the operation, clean the skin with a special detergent (such as a weak alkaline detergent), and then rinse with running water for 15 minutes; clothes need to be disinfected at high temperature (above 60°C) before washing; regular physical examinations (blood routine, liver and kidney function tests every 3 months).

9: Physical and chemical properties and safety characteristics

Physical state	yellow to brown crystals
Colour	Colorless to slightly yellow crystals
Odour	Odorless
Melting point/freezing point	98°C(lit.)
Boiling point or initial boiling point and boiling range	279°C(lit.)
Flammability	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.
Lower and upper explosion limit/flammability limit	no data available
Flash point	169°C
Auto-ignition temperature	282.78°C
Decomposition temperature	at 279°C°C
pH	no data available
Kinematic viscosity	no data available
Solubility	In water:1.6 g/100 mL (25 oC)
Partition coefficient n-octanol/water	no data available
Vapour pressure	0.6 mm Hg (120 °C)
Density and/or relative density	1.481
Relative vapour density	1.244 at 65°C (Relative to Air)
Particle characteristics	no data available

10: Stability and reactivity

10.1 Reactivity

no data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

... Will burn even in absence of air. Dust explosion possible if in powder or granular form, mixed with air. 4-NITROPHENOL is a slightly yellow, crystalline material, moderately toxic. Mixtures with diethyl phosphite may explode when heated. Decomposes exothermally, emits toxic fumes of oxides of nitrogen [Lewis, 3rd ed., 1993, p. 941]. Decomposes violently at 279°C and will burn even in absence of air (USCG, 1999). Solid mixtures of the nitrophenol and potassium hydroxide (1:1.5 mol) readily deflagrate [Bretherick, 5th Ed., 1995].

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Mixtures with diethyl phosphite may explode when heated.

10.6 Hazardous decomposition products

DECOMPOSES VIOLENTLY @ 279 DEG C ...

11: Toxicological information

11.1 Acute toxicity

Oral: LD50 Rat (male) oral 191 mg/kg (95% confidence limits 131-303 mg/kg)

Inhalation: LD50 Rat inhalation > 4.7 mg/L/4 hours

Dermal: no data available

11.2 Skin corrosion/irritation

no data available

11.3 Serious eye damage/irritation

no data available

11.4 Respiratory or skin sensitization

no data available

11.5 Germ cell mutagenicity

no data available

11.6 Carcinogenicity

Cancer Classification: Group D Not Classifiable as to Human Carcinogenicity

11.7 Reproductive toxicity

No information is available on the reproductive or developmental effects of 4-nitrophenol in humans. One animal study reported no histological alterations in the testes and epididymides in mice exposed to 4-nitrophenol by inhalation, while in another study no changes were observed in the reproductive index of pregnant mice given 4-nitrophenol by gavage (placing the chemical experimentally in the stomach).

11.8 STOT-single exposure

no data available

11.9 STOT-repeated exposure

no data available

11.10 Aspiration hazard

no data available

12: Ecological information

12.1 Toxicity

Toxicity to fish: LC50; Species: *Lepomis macrochirus* (bluegill); Conditions: static, unmeasured; Concentration: 8,280 ug/L for 24 hr

Toxicity to daphnia and other aquatic invertebrates: EC50; Species: *Daphnia magna* (Water flea); Conditions: freshwater, renewal, 25°C, pH >7; Concentration: 8000 ug/L for 24 hr; Effect: behavior, equilibrium /formulation

Toxicity to algae: EC50; Species: *Chlorococum* sp. (Green Algae); Conditions: freshwater, static; Concentration: 5 umol/L for 9 days; Effect: population changes, general /formulation

Toxicity to microorganisms: no data available

12.2 Persistence and degradability

PURE CULTURE: *Pseudomonas* strains capable of mineralizing 2,4-dichlorophenol and p-nitrophenol (PNP) in culture media were isolated from soil. A *Pseudomonas* able to mineralize 5.0 ug p-nitrophenol/mL in culture did not mineralize the compound in sterile or nonsterile lake water. The bacterium destroyed p-nitrophenol in sterile sewage and enhanced p-nitrophenol mineralization in nonsterile sewage. When added to the surface of sterile soil, the bacterium mineralized little of the p-nitrophenol present at 5.0 ug/g, but it was active if mixed well with the sterile soil.[Goldstein RM et al; Appl Environ Microbiol 50 (4): 977-83 (1985)] Full text: PMC291779

12.3 Bioaccumulative potential

BCF values of 2.5 to 7.8 were measured for carp (*Carprinus carpio*) exposed to 0.02 ppm and 0.2 ppm 4-nitrophenol over a 6-8 week incubation period(1). The BCF value of 4-nitrophenol was reported as 79 in fathead minnows(2) and 58 in golden orfe(3). According to a classification scheme(4), these BCF values suggest bioconcentration in aquatic organisms is low to moderate.

12.4 Mobility in soil

The sorption of benzoic acid, nitrobenzene, 4-nitrophenol, 2,4-dichlorophenoxyacetic acid, and naphthalene was determined for 10 Danish soils in laboratory studies(1); measured equilibrium isotherms were of nonlinear Freundlich type for nearly all combinations of soil test compounds(1); adsorption was significantly correlated with the organic carbon content of the soils tested(1); Koc values in the 10 soils ranged from 56 to 530 with an average Koc 210(1); no significant correlations with pH and cation exchange capacity were observed(1). The Koc of 4-nitrophenol was reported as 55 in Brookston clay loam(2) and a log Koc of 1.7 was reported in a second study(3). The increasing content of copper in two Chinese soils was shown to limit 4-nitrophenol adsorption(4). In sorption studies using peat, 4-nitrophenol had measured Koc values of 96 (when 4-nitrophenol was in the neutral state) and 16 (when 4-nitrophenol existed as anionic species)(5). Using a reference soil from Germany, 4-nitrophenol had Koc value of 148 in a soil column leaching test(6). A Koc of 26 was measured in one sediment sample from China(7). A median literature Koc value of 234 (log Koc = 2.37) has been reported for 4-nitrophenol which can be used to develop QSAR estimations(8). According to a classification scheme(9), a median Koc value of 234 suggests that 4-nitrophenol is expected to have moderate mobility in soil. However, the experimental Koc range extends from 16 to over 500 suggesting a range of very high mobility to low mobility(SRC). The pKa of 4-nitrophenol is 7.15(10), indicating that this compound will exist partially in anion form in the environment and anions generally do not adsorb more strongly to soils containing organic carbon and clay than their neutral counterparts(11).

12.5 Other adverse effects

no data available

13: Disposal considerations

13.1 Disposal methods for waste chemicals

This must be handled by a qualified unit that handles highly toxic waste, using high-temperature incineration (800-1000°C) or chemical neutralization (such as oxidative decomposition) to completely destroy the toxicity. Liquid highly toxic substances must be solidified before incineration. Those that cannot be incinerated must be stabilized/solidified before being safely landfilled.

13.2 Precautions

Disposal personnel must wear fully enclosed chemical protective suits and positive pressure respirators; waste must be strictly classified and packaged to prevent leakage; exhaust gas and wastewater generated during the disposal process must meet discharge standards; mixing with other types of waste is prohibited; and disposal records must be kept for at least 10 years for traceability.

14: Transport information

14.1 UN Number

ADR/RID: UN1663

IMDG: UN1663

IATA: UN1663

14.2 UN Proper Shipping Name

ADR/RID: NITROPHENOLS (o-, m-, p-) IMDG: NITROPHENOLS (o-, m-, p-) IATA: NITROPHENOLS (o-, m-, p-)

14.3 Transport hazard class(es)

ADR/RID: 6.1 IMDG: 6.1 IATA: 6.1

14.4 Packing group, if applicable

ADR/RID: III IMDG: III IATA: III

14.5 Environmental hazards

ADR/RID: no IMDG: no IATA: no

14.6 Special precautions for user

no data available

14.7 Transport in bulk according to IMO instruments

no data available

15: Regulatory information

15.1 Safety, health and environmental regulations specific for the product in question

Chemical name	Common names and synonyms	CAS number	EC number
4-Nitrophenol	4-Nitrophenol	100-02-7	202-811-7
New Zealand Inventory of Chemicals (NZIoC)			Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Listed.
Vietnam National Chemical Inventory			Listed.
Australian Inventory of Industrial Chemicals (AIIC)			Not Listed.
Catalogue of Strictly Restricted Toxic Chemicals in China			Not Listed.
China Catalog of Hazardous chemicals 2015			Listed.
European INventory of Existing Commercial chemical Substances			Not Listed.
IARC Monographs on the Evaluation of Carcinogenic Risks to Humans			Not Listed.
TSCA Inventory of Chemical Substances			Listed.

16: Other information

Information on revision

SDS Creation Date July 1, 2025

SDS Revision Date July 1, 2025

Abbreviations and acronyms in SDS

- CAS: Chemical Abstracts Service
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
- IMDG: International Maritime Dangerous Goods
- IATA: International Air Transportation Association
- TWA: Time Weighted Average
- STEL: Short term exposure limit
- LC50: Lethal Concentration 50%
- LD50: Lethal Dose 50%
- EC50: Effective Concentration 50%

SDS References

- IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>
- HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>
- IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>
- eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
- CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>
- ChemIDplus, website: <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>
- ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>
- Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>
- ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>

Any questions regarding this Safety Data Sheet, Please send your inquiry to info@molwiki.com

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