

NITROBENZENE

GHS Safety Data Sheet

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

NITROBENZENE

OTHER NAMES

C6-H5-NO2, "essence of mirbane", myrbane, nitrobenzol, "benzene, nitro-"

PROPER SHIPPING NAME

NITROBENZENE

PRODUCT USE

Manufacture of aniline, solvent for cellulose ethers, modifying esterification of cellulose acetate, ingredient of metal polishes and shoe polishes, manufacture of benzidine, quinoline and azobenzene etc.

SUPPLIER

Company: S D FINE- CHEM LIMITED

Address:

315- 317, T.V. INDUSTRIAL ESTATE,

248, WORLI,

MUMBAI- 400030.INDIA.

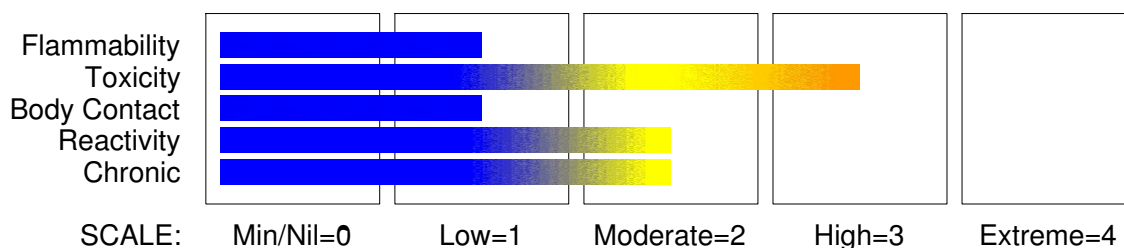
technical@sdfine.com

Telephone: 91- 22- 24959898

Telephone: 91- 22- 24959899

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HAZARD RATINGS



Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Acute Toxicity (Dermal) Category 3

Acute Toxicity (Inhalation) Category 2

Acute Toxicity (Oral) Category 3

Carcinogen Category 2

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Section 2 - HAZARDS IDENTIFICATION

Chronic Aquatic Hazard Category 2
Eye Irritation Category 2B
Flammable Liquid Category 4
Organ Damage Category 1
Reproductive Toxicity Category 2
Skin Corrosion/Irritation Category 3



EMERGENCY OVERVIEW

HAZARD

DANGER

Determined by using GHS criteria:

H227 H330 H311 H301 H316 H320 H351 H361 H372 H411

Combustible Liquid

Fatal if inhaled

Toxic in contact with skin

Toxic if swallowed

Causes mild skin irritation

Causes eye irritation

Suspected of causing cancer

Suspected of damaging fertility

Causes damage to organs through prolonged or repeated exposure.

Toxic to aquatic life with long lasting effects

PRECAUTIONARY STATEMENTS

Prevention

Wear protective gloves/clothing

Wash hands thoroughly after handling.

Wear respiratory protection.

Do not breathe dust/fume/gas/mist/vapours/spray.

Use only outdoors or in a well ventilated area.

Do not eat, drink or smoke when using this product.

Do not handle until all safety precautions have been read and understood.

Use explosion-proof electrical/ventilating/lighting/equipment

Keep away from flames and hot surfaces.

Use personal protective equipment as required.

Obtain special instructions before use.

Response

If exposed or concerned: Get medical attention advice.

IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.

If skin irritation occurs, seek medical advice/attention.

If eye irritation persists, get medical advice/attention.

Keep container tightly closed.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Get medical advice/attention if you feel unwell.

Call a POISON CENTER or doctor/physician if you feel unwell.

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

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Section 2 - HAZARDS IDENTIFICATION

Specific treatment: refer to Label or MSDS.
Remove/Take off immediately all contaminated clothing
Immediately call a POISON CENTER or doctor/physician.
Wash/Decontaminate removed clothing before reuse.
IF ON SKIN: Gently wash with plenty of soap and water.

Storage

Store away from other materials
Store locked up.

Disposal

Dispose of contents and container in accordance with relevant legislation.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
nitrobenzene	98-95-3	>98

Section 4 - FIRST AID MEASURES

SWALLOWED

For advice, contact a Poisons Information Centre or a doctor.
· IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
· For advice, contact a Poisons Information Centre or a doctor.
Where Medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:
· Induce vomiting with fingers down the back of the of the throat, ONLY IF CONSCIOUS.
· Lean patient forward or place on left side (head-down position if possible) to maintain open airway and prevent aspiration.
NOTE: Wear a protective glove when inducing vomiting by mechanical means.
· In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
· If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided.
Further action will be the responsibility of the medical specialist.
· If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

EYE

If this product comes in contact with the eyes:
· Immediately hold eyelids apart and flush the eye continuously with running water.
· Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
· Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
· Transport to hospital or doctor without delay.
· Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water.

INHALED

· If fumes or combustion products are inhaled remove from contaminated area.

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- Lay patient down. Keep warm and rested.
- Prosthesis such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.

NOTES TO PHYSICIAN

Symptoms of vasodilation and reflex tachycardia may present following organic nitrate overdose; most organic nitrates are extensively metabolised by hydrolysis to inorganic nitrites. Organic nitrates and nitrites are readily absorbed through the skin, lungs, mucosa and gastro-intestinal tract.

The toxicity of nitrates and nitrites result from their vasodilating properties and their propensity to form methaemoglobin.

- Most produce a peak effect within 30 minutes.
- Clinical signs of cyanosis appear before other symptoms because of the dark pigmentation of methaemoglobin.
- Initial attention should be directed towards improving oxygen delivery, with assisted ventilation, if necessary. Hyperbaric oxygen has not demonstrated conclusive benefits.
- Institute cardiac monitoring, especially in patients with coronary artery or pulmonary disease.
- Hypotension should respond to Trendelenburg's position and intravenous fluids; otherwise dopamine may be needed.
- Naloxone, glucose and thiamine should be given if a multiple ingestion is suspected.
- Decontaminate using Ipecac Syrup for alert patients or lavage for obtunded patients who present within 2-4 hours of ingestion.
- Symptomatic patients with methaemoglobin levels over 30% should receive methylene blue. (Cyanosis alone, is not an indication for treatment). The usual dose is 1-2 mg/kg of a 1% solution (10 mg/ml) IV over 5 minutes; repeat, using the same dose if symptoms of hypoxia fail to subside within 1 hour.

[Ellenhorn and Barceloux: Medical Toxicology]

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Methaemoglobin in blood	1.5% of haemoglobin	During or end of shift	B, NS, SQ

B: Background levels occur in specimens collected from subjects NOT exposed

NS: Non-specific determinant; also observed after exposure to other materials

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

Alert Fire Brigade and tell them location and nature of hazard.

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Section 5 - FIRE FIGHTING MEASURES

- Wear full body protective clothing with breathing apparatus.
 - Prevent, by any means available, spillage from entering drains or water courses.
- Water spray or fog may be used to disperse vapour.
Cool fire exposed containers with water spray from a protected location.
If safe to do so, remove containers from path of fire.

FIRE/EXPLOSION HAZARD

Combustible.

Moderate explosion hazard when exposed to heat or flame.

Vapour may readily form an explosive mixture with air.

Reacts violently with many incompatible materials.

Vapour may travel a considerable distance to source of ignition.

Decomposes on heating and produces toxic fumes of carbon monoxide (CO) and nitrogen oxides (NOx).

Personal Protective Equipment

Breathing apparatus.

Gas tight chemical resistant suit.

Limit exposure duration to 1 BA set 30 mins.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

DO NOT touch the spill material and Clear area of personnel.

Clean up all spills immediately.

Environmental hazard - contain spillage.

Avoid breathing vapours and contact with skin and eyes.

Wear fully protective PVC clothing and breathing apparatus.

Remove all ignition sources.

Contain and absorb spill with sand, earth, inert material or vermiculite.

Place spilled material in clean, dry, sealable, labelled container.

MAJOR SPILLS

DO NOT touch the spill material.

Clear area of personnel and move upwind.

Alert Fire Brigade and tell them location and nature of hazard.

- Wear full body protective clothing with breathing apparatus.
 - Prevent, by any means available, spillage from entering drains or water courses.
- absorb vapour.

Contain spill with sand, earth or vermiculite.

Collect recoverable product into labelled containers for recycling.

Absorb remaining product with sand, earth or vermiculite.

Collect residues and seal in labelled drums for disposal.

Wash area down with large quantity of water and prevent runoff into drains.

After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.

If contamination of drains or waterways occurs, advise emergency services.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

nitrobenzene 200 ppm

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Section 6 - ACCIDENTAL RELEASE MEASURES

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

nitrobenzene 20 ppm

other than mild, transient adverse effects without perceiving a clearly defined odour is:

nitrobenzene 3 ppm

The threshold concentration below which most people will experience no appreciable risk of health effects:

nitrobenzene 1 ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	$\geq 0.1\%$	Toxic (T)	$\geq 3.0\%$
R50	$\geq 0.25\%$	Corrosive (C)	$\geq 5.0\%$
R51	$\geq 2.5\%$		
else	$\geq 10\%$		

where percentage is percentage of ingredient found in the mixture

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X



X



+



X



X



+

+: May be stored together

O: May be stored together with specific preventions

X: Must not be stored together

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

Use good occupational work practice. Observe manufacturer's storing and handling recommendations.

Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Avoid all personal contact, including inhalation.

Avoid generating and breathing mist and vapour.

Wear protective clothing when risk of exposure occurs.

Avoid smoking, naked lights, heat or ignition sources.

and secure containers when dispensing or pouring product.

Local exhaust ventilation may be required for safe working, i.e. to keep exposures below required standards, otherwise PPE is required.

Use in a well-ventilated area.

Avoid contact with incompatible materials.

When handling, DO NOT eat, drink or smoke.

Avoid physical damage to containers.

Wash hands with soap and water after handling.

Launder contaminated clothing before re-use.

SUITABLE CONTAINER

· Lined metal can, lined metal pail/ can.

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Section 7 - HANDLING AND STORAGE

- Plastic pail.
 - Polyliner drum.
 - Packing as recommended by manufacturer.
 - Check all containers are clearly labelled and free from leaks.
- DO NOT use aluminium, galvanised or tin-plated containers.

STORAGE INCOMPATIBILITY

Nitroaromatic and in particular polynitroaromatic compounds may present a severe explosion risk if subjected to shock or heated rapidly and uncontrollably as in fire situations. In addition, when such compounds are heated more moderately with caustic alkalis, even when water or organic solvents are present, there is also a risk of violent decomposition or explosion. Several industrial accidents, which probably were due to such interactions, have occurred; this potential hazard often remains unacknowledged. A range of exothermic decomposition energies for nitro compounds is given as 220-410 kJ/mol. The relationship between energy of decomposition and processing hazards has been the subject of discussion; it is suggested that values of energy released per unit of mass, rather than on a molar basis (J/g) be used in the assessment. For example, in "open vessel processes" (with man-hole size openings, in an industrial setting), substances with exothermic decomposition energies below 500 J/g are unlikely to present a danger, whilst those in "closed vessel processes" (opening is a safety valve or bursting disk) present some danger where the decomposition energy exceeds 150 J/g. BRETHERICK: Handbook of Reactive Chemical Hazards, 4th Edition.

Segregate from reducing agents, oxidising agents, alkalis, zinc, tin, aluminium chloride, aniline plus glycerine, nitric acid, nitrogen tetroxide, silver perchlorate.

STORAGE REQUIREMENTS

Observe manufacturer's storing and handling recommendations.
Store in original containers.
Keep containers securely sealed.
No smoking, naked lights, heat or ignition sources.
Store in a cool, dry place.
Store in a well-ventilated area.
Store away from incompatible materials.
Store away from foodstuff containers.
Outside or detached storage is preferred.
DO NOT store in pits, depressions, basements or areas where vapours may be trapped.
Protect containers against physical damage.
Check regularly for spills and leaks.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

- nitrobenzene: CAS:98- 95- 3

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
nitrobenzene		200 [Unch]

ODOUR SAFETY FACTOR (OSF)

OSF=56 (NITROBENZENE)

Exposed individuals are reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

Odour Safety Factor (OSF) is determined to fall into either Class A or B.

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

The Odour Safety Factor (OSF) is defined as:

OSF= Exposure Standard (TWA) ppm/ Odour Threshold Value (OTV) ppm

Classification into classes follows:

Class	OSF	Description
A	550	Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV- TWA for example) is being reached, even when distracted by working activities
B	26- 550	As " A" for 50- 90% of persons being distracted
C	1- 26	As " A" for less than 50% of persons being distracted
D	0.18- 1	10- 50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached
E	<0.18	As " D" for less than 10% of persons aware of being tested

MATERIAL DATA

Odour Threshold Value: 0.072-1.9 ppm (detection)

An air-borne concentration of 1 ppm is generally regarded as a no-observed-adverse effect-level. Hepatotoxicity, neurotoxicity, methaemoglobinaemia, ocular irritation and contact dermatitis after animal or human exposure to nitrobenzene have all been reported. The TLV-TWA is protective against these effects. Reports of acute and chronic toxicities arising from topical application have necessitated the recommendation of a skin notation. It has been estimated that at 1 ppm nitrobenzene, in air, 8 mg is absorbed through the skin over an 8-hour working day and that 20% is eliminated in the urine.

PERSONAL PROTECTION



EYE

- Safety glasses with side shields.
- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

OTHER

- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

" Forsberg Clothing Performance Index" .

The effect(s) of the following substance(s) are taken into account in the computer- generated selection: nitrobenzene

Protective Material:

BUTYL	A
PE/EVAL/PE	A
PVA	A
SARANEX- 23 2- PLY	A
VITON/CHLOROBUTYL	A
VITON	A
SARANEX- 23	A
TEFLON	B
NEOPRENE	B
CPE	B
NATURAL RUBBER	C

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

RESPIRATOR

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	AB- AUS	-
1000	50	-	AB- AUS
5000	50	Airline *	-
5000	100	-	AB- 2
10000	100	-	AB- 3
	100+		Airline**

* - Continuous Flow

** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

For further information consult your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

Use in a well-ventilated area or Local exhaust ventilation may be required for safe working, i.e. to keep exposures below required standards, otherwise PPE is required. Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.

An approved self contained breathing apparatus (SCBA) may be required in some situations. Provide adequate ventilation in warehouse or closed storage area. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapours, degreasing etc., evaporating from tank (in still air).	0.25- 0.5 m/s (50- 100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5- 1 m/s (100- 200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1- 2.5 m/s (200- 500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Yellow crystals or yellow to brown oily liquid. Slightly soluble in water.
Almond or shoe polish odour. Soluble in alcohol, acetone, benzene, ether.

PHYSICAL PROPERTIES

Liquid.

Does not mix with water.

Sinks in water.

Toxic or noxious vapours/gas.

Molecular Weight: 123.11 Pure

Melting Range (°C): 5.7

Solubility in water (g/L): Partly miscible

pH (1% solution): Not applicable

Volatile Component (%vol): Not available.

Relative Vapour Density (air=1): 4.25

Lower Explosive Limit (%): 1.8 @ 93 C

Autoignition Temp (°C): 482

State: Liquid

Boiling Range (°C): 210.8

Specific Gravity (water=1): 1.20

pH (as supplied): Not applicable

Vapour Pressure (kPa): 0.02 at 20 C

Evaporation Rate: Slow

Flash Point (°C): 87.7

Upper Explosive Limit (%): 40

Decomposition Temp (°C): Not Available

Viscosity: Not Available

log Kow (Prager 1995): 1.85

log Kow (Sangster 1997): 1.85

log Kow: 1.85-1.88

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.

Considered an unlikely route of entry in commercial/industrial environments.

The substance and/or its metabolites may bind to haemoglobin inhibiting normal uptake of oxygen. This condition, known as "methaemoglobinemia", is a form of oxygen starvation (anoxia).

Symptoms include cyanosis (a bluish discolouration skin and mucous membranes) and breathing difficulties. Symptoms may not be evident until several hours after exposure.

At about 15% concentration of blood methaemoglobin there is observable cyanosis of the

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Section 11 - TOXICOLOGICAL INFORMATION

lips, nose and earlobes. Symptoms may be absent although euphoria, flushed face and headache are commonly experienced. At 25-40%, cyanosis is marked but little disability occurs other than that produced on physical exertion. At 40-60%, symptoms include weakness, dizziness, lightheadedness, increasingly severe headache, ataxia, rapid shallow respiration, drowsiness, nausea, vomiting, confusion, lethargy and stupor. Above 60% symptoms include dyspnea, respiratory depression, tachycardia or bradycardia, and convulsions. Levels exceeding 70% may be fatal.

EYE

Limited evidence exists, or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals and/or is expected to produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.

The vapour is discomforting.

The material may be irritating to the eye, with prolonged contact causing inflammation.

Repeated or prolonged exposure to irritants may produce conjunctivitis.

SKIN

Skin contact with the material may produce toxic effects; systemic effects may result following absorption.

Limited evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.

Bare unprotected skin should not be exposed to this material.

Toxic effects may result from skin absorption.

Reactions may not occur on exposure but response may be delayed with symptoms only appearing many hours later.

The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

INHALED

The material is not thought to produce respiratory irritation (as classified by EC Directives using animal models). Nevertheless inhalation, of the material, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress. Inhalation hazard is increased at higher temperatures.

Inhalation of vapour may aggravate a pre-existing respiratory condition.

CHRONIC HEALTH EFFECTS

On the basis, primarily, of animal experiments, concern has been expressed that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment.

Principal routes of exposure are usually by.

skin contact/absorption and inhalation of vapour.

Repeated exposure may be followed by liver impairment up to yellow atrophy, jaundice and anaemia of varying degrees, with the presence of Heinz bodies

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Section 11 - TOXICOLOGICAL INFORMATION

in the red cell.

Occupational exposure has been reported to produce parasthesia and vague symptoms of neurologic damage. In subacute or chronic forms of poisoning, anaemia is the major symptom. Neurological symptoms, including headache, vertigo and nausea, hepatotoxicity (enlarged liver, uterus and altered serum chemistry, hyperbilirubinaemia and decreased prothrombin activity), mild eye irritation and contact dermatitis have also been described.

In experimental animals chronic exposure has produced lesions of the brain and adrenals, damage to the liver, kidneys, spleen and testes. In inhalation studies with mice, the incidence of alveolar-bronchiolar neoplasms and thyroid follicular-cell adenomas were increased in males. In rats, males showed an increased incidence of hepatocellular neoplasms, thyroid follicular-cell adenomas and adenocarcinomas and renal tubular-cell adenomas. Treated female rats showed an increased incidence of hepatocellular neoplasms and endometrial stromal polyps. A decreased incidence of fertility index occurred in a two-generation reproduction study in rats

TOXICITY AND IRRITATION

TOXICITY

Oral (woman) TDLo: 200 mg/kg

Dermal (rabbit) LD50: 600 mg/kg

Oral (rat) LD50: 640 mg/kg* [CCINFO]*

WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.

IRRITATION

Skin (rabbit): 500 mg/24h - Mild

Eye (rat): 500 mg/24h - Mild

Section 12 - ECOLOGICAL INFORMATION

Hazardous Air Pollutant:	Yes
Fish LC50 (96hr.) (mg/l):	20- 100 (6h)
Daphnia magna EC50 (48hr.) (mg/l):	2.7
Algae IC50 (72hr.) (mg/l):	1.9- 33
log Kow (Prager 1995):	1.85
log Kow (Sangster 1997):	1.85
log Pow (Verschuereen 1983):	1.85/1.88
ThOD:	1.95
Half- life Soil - High (hours):	4728
Half- life Soil - Low (hours):	322
Half- life Air - High (hours):	5.44
Half- life Air - Low (hours):	0.544
Half- life Surface water - High (hours):	4728
Half- life Surface water - Low (hours):	322
Half- life Ground water - High (hours):	9456
Half- life Ground water - Low (hours):	48
Aqueous biodegradation - Aerobic - High (hours):	4728
Aqueous biodegradation - Aerobic - Low (hours):	322
Aqueous biodegradation - Anaerobic - High (hours):	300
Aqueous biodegradation - Anaerobic - Low (hours):	48
Aqueous biodegradation - Removal secondary treatment - High (hours):	97.80%
Aqueous biodegradation - Removal secondary treatment - Low (hours):	76%
Aqueous photolysis half- life - High (hours):	4800
Aqueous photolysis half- life - Low (hours):	1608
Photolysis maximum light absorption - High (nano- m):	259
Aqueous photolysis half- life - High (hours):	4800
Aqueous photolysis half- life - Low (hours):	1608
Photooxidation half- life water - High (hours):	1.90E+05
Photooxidation half- life water - Low (hours):	3009
Photooxidation half- life air - High (hours):	5.44

continued...

NITROBENZENE

Section 12 - ECOLOGICAL INFORMATION

Photooxidation half- life air - Low (hours):

0.544

The nitrates are of environmental concern because of their high water solubility and consequent leaching, diffusion, and environmental mobility in soil and water. Nitrate can contaminate groundwater to unacceptable levels. Nitrite is formed from nitrate or ammonium ion by micro-organisms in soil, water, sewage and the alimentary tract. The concern with nitrate in the environment is related to its conversion to nitrite.

Methaemoglobinaemia is caused following exposure to high levels of nitrite and produces difficulties in oxygen transport in the blood. Thousands of cases involving poisoning of infants, particularly in rural areas, have been reported as a result of drinking nitrate rich well-water.

Other concerns deriving from exposure to environmental nitrates relate to the production of nitrosamines following the reaction of food nitrites and secondary amines. Other nitroso-compounds may result following reaction with nitrites and amides, ureas, carbamates and other nitrogenous compounds. Nitrosamines produce liver damage, haemorrhagic lung lesions, convulsions and coma in rats, and teratogenic effects in experimental animals.

The N-nitroso class of compounds include potent carcinogens and mutagens: induction of tumors by single doses of N-nitroso compounds testify to this.

log Kow: 1.85-1.88

Koc: 30.6-370

Half-life (hr) H₂O surface water: 24-90

Henry's atm m³ /mol: 2.44E-05

BOD 5 if unstated: nil

ThOD: 1.95

BCF: 24

Log BCF: 0.78-1.38

Nitrif. inhib.: 76% inhib at 100mg/L

Section 13 - DISPOSAL CONSIDERATIONS

- Consult manufacturer for recycling options and recycle where possible .
- Consult State Land Waste Management Authority for disposal.
- Incinerate residue at an approved site.
- Recycle containers if possible, or dispose of in an authorised landfill.

WASTE DISPOSAL PROCEDURES

- Place the recoverable quantities of nitrobenzene into a non halogenated solvent disposal container for recycling or incineration. Burn in a furnace equipped with an afterburner and scrubber [Armour 1996].

SPILLAGE DISPOSAL

- Clear area of personnel. Wear breathing apparatus, eye protection and butyl rubber gloves to control personal contact from nitrobenzene. Contain the spill with a 1:1:1 mixture by weight of sodium carbonate or calcium carbonate, bentonite and sand. Collect the absorbed mixture in a labelled container for incineration. Burn in a furnace equipped with an afterburner and scrubber. The area of the spill should be washed thoroughly with water and a soapy solution [Armour 1996].

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Section 14 - TRANSPORTATION INFORMATION



Labels Required: TOXIC
HAZCHEM: 2X

UNDG:

Dangerous Goods Class: 6.1
UN Number: 1662
Shipping Name: NITROBENZENE

Subrisk: None
Packing Group: II

Air Transport IATA:

ICAO/IATA Class: 6.1
UN/ID Number: 1662
ERG Code: 6L
Shipping name: NITROBENZENE

ICAO/IATA Subrisk: None
Packing Group: II

Maritime Transport IMDG:

IMDG Class: 6.1
UN Number: 1662
EMS Number: F- A, S- A
Shipping name: NITROBENZENE

IMDG Subrisk: None
Packing Group: II

Section 15 - REGULATORY INFORMATION

REGULATIONS

nitrobenzene (CAS: 98-95-3) is found on the following regulatory lists;
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk
International Agency for Research on Cancer (IARC) Carcinogens
OECD Representative List of High Production Volume (HPV) Chemicals

Section 16 - OTHER INFORMATION

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

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