



UK Health
Security
Agency

Benzotrifluoride

Incident management

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Main points

General

Benzotrichloride is a colourless to yellow oily liquid with a pungent odour. It is a chlorinated toluene and it is slightly combustible.

Benzotrichloride reacts violently with strong oxidants, amines and light metals, causing a fire and explosion hazard; it can also attack some rubbers, plastics and coatings. It decomposes on heating and emits toxic hydrogen chloride fumes.

In the event of a fire involving benzotrichloride, use fine water spray and chemical protective clothing with liquid-tight connections and breathing apparatus.

Health

Major routes of exposure are inhalation, ingestion and dermal contact.

Inhalation causes irritation of the eyes, nose, throat and mucous membranes; in severe cases, pulmonary oedema or lung injury may develop.

Ingestion causes irritation or burns, anorexia, nausea, vomiting, diarrhoea and abdominal cramping or pain.

Dermal contact may cause dermal irritation and burns. Ocular exposure to benzotrichloride vapour causes irritation and direct contact with the liquid may cause severe burns.

Casualty decontamination at the scene

Following disrobe, improvised wet decontamination should be considered for an incident involving benzotrichloride which may be caustic or corrosive.

Environment

Avoid the release of benzotrichloride to the environment; inform the [Environment Agency](#) of substantial incidents.

Hazard identification

Table 1. Standard (UK) dangerous goods emergency action codes

UN		2226	Benzotrichloride	
EAC		2X	Use fine water spray. Wear chemical protective clothing with liquid-tight connections for whole body in combination with breathing apparatus [note 1]. Spillages and decontamination run-off should be prevented from entering drains and watercourses	
APP		–	–	
Hazards	Class	8	Corrosive substance	
	Sub-risks	–	–	
HIN		80	Corrosive or slightly corrosive substance	

Abbreviations

UN = United Nations number.

EAC = emergency action code.

APP = additional personal protection.

HIN = hazard identification number.

Notes to Table 1

[note 1] Chemical protective clothing with liquid tight connections for whole body (type 3) conforming to the relevant standards such as BS 8428 or EN 14605, in combination with breathing apparatus BS EN 137.

Reference

'[Dangerous Goods Emergency Action Code List](#)'. National Chemical Emergency Centre (NCEC), part of Ricardo-AEA. The Stationery Office (2021)

Table 2. The GB classification, labelling and packaging (CLP) regulation

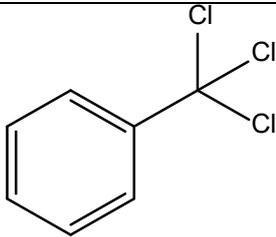
Hazard class and category	Carc. 1B	Carcinogenicity category, 1B	
	Acute Tox. 3	Acute toxicity (inhalation), category 3	
	Acute Tox. 4	Acute toxicity (oral), category 4	
	STOT SE 3	Specific target organ toxicity following single exposure, category 3	
	Skin Irrit. 2	Skin irritation, category 2	
	Eye Dam. 1	Serious eye damage, category 1	
	Hazard statement	H350	May cause cancer
H331		Toxic if inhaled	
H302		Harmful if swallowed	
H335		May cause respiratory irritation	
H315		Causes skin irritation	
H318		Causes serious eye damage	
Signal words	DANGER		

Reference

The Health and Safety Executive (HSE). '[GB CLP Regulation](#)' (viewed June 2022)

Physicochemical properties

Table 3. Physicochemical properties

CAS number	98-07-7
Molecular weight	195.5
Formula	C ₇ H ₅ Cl ₃ / C ₆ H ₅ CCl ₃
Common synonyms	alpha,alpha,alpha-trichlorotoluene, trichlorophenylmethane, phenylchloroform, trichloromethylbenzene
State at room temperature	Colourless to yellow fuming oily liquid
Volatility	Vapour pressure: 0.414 mmHg at 25°C
Specific gravity	1.4 at 20°C (water = 1)
Vapour density	6.8 (air = 1)
Flammability	Slightly combustible
Lower explosive limit	2.1%
Upper explosive limit	6.5%
Water solubility	Insoluble in water
Reactivity	Liquid benzotrichloride will fume on contact with air. Reacts violently with strong oxidants, amines and light metals, causing a fire and explosion hazard. It can also attack some rubbers, plastics and coatings
Reaction or degradation products	Decomposes on heating, contact with acids and water, producing toxic and corrosive fumes including hydrogen chloride
Odour	Pungent odour
Structure	

References

International Programme on Chemical Safety. '[International chemical safety card entry for Benzotrichloride](#)'. ICSC 0105, 2008. World Health Organization (WHO) Geneva

PubChem. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information. '[PubChem Compound Summary for CID 7367, Benzotrichloride](#)' (viewed June 2022)

Reported effect levels from authoritative sources

Data not available.

Published emergency response guidelines

Table 4. Acute exposure guideline levels (AEGs)

	Concentration				
	10 min	30 min	60 min	4 hours	8 hours
AEGL-1 [note 1]	Data not available				
AEGL-2 [note 2]	Data not available				
AEGL-3 [note 3]	Data not available				

Notes to Table 4

[note 1] Level of the chemical in air at or above which the general population could experience notable discomfort.

[note 2] Level of the chemical in air at or above which there may be irreversible or other serious long-lasting effects or impaired ability to escape.

[note 3] Level of the chemical in air at or above which the general population could experience life-threatening health effects or death.

Exposure standards, guidelines or regulations

Table 5. Occupational standards

	LTEL (8-hour reference period)		STEL (15-min reference period)	
	ppm	mg/m ³	ppm	mg/m ³
WEL	No guideline value specified			

Abbreviations

WEL = workplace exposure limit.

LTEL = long-term exposure limit.

STEL = short-term exposure limit.

Table 6. Public health guidelines

UK drinking water standard	No guideline value specified
WHO guideline for drinking water quality	No guideline value specified
WHO air quality guideline	No guideline value specified

Health effects

Major route of exposure

Inhalation and ingestion.

Immediate signs or symptoms of acute exposure

Inhalation causes irritation to the respiratory tract; in severe cases, pulmonary oedema or lung injury may occur.

Ingestion may cause vomiting and could result in aspiration pneumonitis.

Dermal exposure causes irritation.

Ocular exposure may cause severe irritation.

Reference

International Programme on Chemical Safety. '[International chemical safety card entry for Benzotrichloride](#)'. ICSC 0105, 2008. World Health Organization (WHO) Geneva

Decontamination at the scene

Chemical specific advice

The approach used for decontamination at the scene will depend upon the incident, location of the casualties and the chemicals involved. Therefore, a risk assessment should be conducted to decide on the most appropriate method of decontamination.

Following disrobe, improvised wet decontamination should be considered for an incident involving benzotrichloride which is corrosive.

People who are processed through improvised decontamination should subsequently be moved to a safe location, triaged and subject to health and scientific advice. Based on the outcome of the assessment, they may require further decontamination.

Emergency services and public health professionals can obtain further advice from the UK Health Security Agency (Radiation, Chemicals and Environment Directorate) using the 24-hour chemical hotline number: 0344 892 0555.

Disrobe

The disrobe process is highly effective at reducing exposure to HAZMAT/CBRN material when performed within 15 minutes of exposure.

Therefore, disrobe must be considered the primary action following evacuation from a contaminated area.

Where possible, disrobe at the scene should be conducted by the casualty themselves and should be systematic to avoid transferring any contamination from clothing to the skin. Consideration should be given to ensuring the welfare and dignity of casualties as far as possible.

Improvised decontamination

Improvised decontamination is an immediate method of decontamination prior to the use of specialised resources. This should be performed on all contaminated casualties, unless medical advice is received to the contrary. Improvised dry decontamination should be considered for an incident involving chemicals unless the agent appears to be corrosive or caustic.

Improvised dry decontamination

Any available dry absorbent material can be used such as kitchen towel, paper tissues (for example blue roll) and clean cloth.

Exposed skin surfaces should be blotted and rubbed, starting with the face, head and neck and moving down and away from the body.

Rubbing and blotting should not be too aggressive, or it could drive contamination further into the skin.

All waste material arising from decontamination should be left in situ, and ideally bagged, for disposal at a later stage.

Improvised wet decontamination

Water should only be used for decontamination where casualty signs and symptoms are consistent with exposure to caustic or corrosive substances such as acids or alkalis.

Wet decontamination may be performed using any available source of water such as taps, showers, fixed installation hose-reels and sprinklers.

When using water, it is important to try and limit the duration of decontamination to between 45 and 90 seconds and, ideally, to use a washing aid such as cloth or sponge.

Improvised decontamination should not involve overly aggressive methods to remove contamination as this could drive the contamination further into the skin.

Where appropriate, seek professional advice on how to dispose of contaminated water and prevent run-off going into the water system.

Additional notes

Following improvised decontamination, remain cautious and observe for signs and symptoms in the decontaminated person and in unprotected staff.

If water is used to decontaminate casualties this may be contaminated, and therefore hazardous, and a potential source of further contamination spread.

All materials (paper tissues and so on) used in this process may also be contaminated and, where possible, should not be used on new casualties.

The risk from hypothermia should be considered when disrobe and any form of wet decontamination is carried out.

People who are contaminated should not eat, drink or smoke before or during the decontamination process and should avoid touching their face.

Consideration should be given to ensuring the welfare and dignity of casualties as far as possible. Immediately after decontamination the opportunity should be provided to dry and dress in clean robes or clothes.

Interim wet decontamination

Interim decontamination is the use of standard fire and rescue service (FRS) equipment to provide a planned and structured decontamination process prior to the availability of purpose-designed decontamination equipment.

Decontamination at the scene references

Home Office. [‘Initial operational response to a CBRN incident.’](#) Version 2.0 (July 2015)

NHS England. [‘Emergency Preparedness, Resilience and Response \(EPRR\): Guidance for the initial management of self-presenters from incidents involving hazardous materials.’](#) (February 2019)

Clinical decontamination and first aid

Clinical decontamination is the process where trained healthcare professionals using purpose designed decontamination equipment treat contaminated persons individually.

[Detailed information on clinical management](#) can be found on TOXBASE.

Important notes

Once body surface contaminants have been removed or if your patient was exposed by ingestion or inhalation, the risk that secondary care givers may become contaminated is very low. Secondary carers should wear standard hospital PPE as a precaution against secondary contamination from vomit and body fluids.

If the patient has not been decontaminated following surface contamination, secondary carers must wear appropriate NHS PPE for chemical exposure to avoid contaminating themselves.

The area should be well ventilated.

Clinical decontamination following surface contamination

Carry out decontamination after resuscitation.

This should be performed in a well-ventilated area, preferably with its own ventilation system.

Avoid contaminating yourself with this product and wash any exposed area.

Contaminated clothing should be removed, double-bagged, sealed and stored safely.

Decontaminate open wounds first and avoid contamination of unexposed skin.

Any particulate matter adherent to skin should be removed and the patient washed with soap and copious amounts of water under low pressure for at least 10 to 15 minutes.

Pay particular attention to mucous membranes, moist areas such as skin folds, fingernails and ears.

The earlier irrigation begins, the greater the benefit.

Dermal exposure

Decontaminate (as above) the patient following surface contamination.

Following decontamination recheck the pH of affected areas after a period of 15 to 20 minutes and repeat irrigation if abnormal. Burns with strong solutions may require irrigation for several hours or more.

Once the pH is normal and stabilised, treat as for a thermal injury.

Burns totalling more than 15% of the body surface area in adults (more than 10% in children) will require standard fluid resuscitation as for thermal burns.

Moderate or severe chemical burns should be reviewed by a burns specialist.

Other supportive measures as indicated by the patient's clinical condition

Ocular exposure

Remove contact lenses if present.

Anaesthetise the eye with a topical local anaesthetic (for example, oxybuprocaine, amethocaine or similar). However, do not delay irrigation if local anaesthetic is not immediately available.

Immediately irrigate the affected eye thoroughly with 1,000mL 0.9% saline (for example, by an infusion bag with a giving set). A Morgan Lens may be used if anaesthetic has been given.

Irrigate for 10 to 15 minutes irrespective of initial conjunctival pH. Aim for a final conjunctival pH of 7.5 to 8.0. The conjunctivae may be tested with indicator paper. Retest 20 minutes after irrigation and use further irrigation if necessary.

Repeated instillation of local anaesthetics may reduce discomfort and help more thorough decontamination. However, prolonged use of concentrated local anaesthetics is damaging to the cornea.

Patients with corneal damage, those who have been exposed to strong acids or alkalis and those whose symptoms do not resolve rapidly should be discussed urgently with an ophthalmologist.

Patients with minor corneal damage who are being discharged may be managed with oral analgesia, topical NSAIDs and topical prophylactic antibiotics. Eye review may be necessary as discussed with an ophthalmologist.

Other supportive measures as indicated by the patient's clinical condition.

Ingestion

Maintain a clear airway and ensure adequate ventilation.

In severely affected patients critical care input is essential. Urgent assessment of the airway is required. A supraglottic-epiglottic burn with erythema and oedema is usually a sign that further oedema will occur that may lead to airway obstruction.

Do **not** attempt gastric lavage.

Do **not** give neutralising chemicals as heat produced during neutralisation reactions may increase injury.

The use of water or milk (maximum initial volume = 100 to 200mL in an adult; 2 mL/kg in a child) as diluents in the management of corrosive ingestion may be of some symptomatic benefit (but caution is necessary following large ingestions where mucosal damage / perforation may have already developed). There is experimental evidence to suggest that early dilution therapy with water or milk reduces acute alkali injury of the oesophagus but administration of large volumes of fluid should be avoided as they may induce vomiting and increase the risk of oedema.

Monitor blood pressure, pulse and oxygen saturation.

Perform a 12 lead ECG in all patients who require assessment.

Other supportive measures as indicated by the patient's clinical condition.

Inhalation

Maintain a clear airway and ensure adequate ventilation.

Give oxygen if required.

Perform a 12 lead ECG

Other supportive measures as indicated by the patient's clinical condition.

Clinical decontamination and first aid references

[TOXBASE](#)

TOXBASE Corrosives – Ingestion

TOXBASE Corrosives – Inhalation

TOXBASE Skin decontamination- corrosives

TOXBASE Chemicals splashed or sprayed into eyes

About the UK Health Security Agency

UKHSA is responsible for protecting every member of every community from the impact of infectious diseases, chemical, biological, radiological and nuclear incidents and other health threats. We provide intellectual, scientific and operational leadership at national and local level, as well as on the global stage, to make the nation health secure.

[UKHSA](#) is an executive agency, sponsored by the [Department of Health and Social Care](#).

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