UK Health
Security
Agency

1,2-dibromoethane

Incident management

This document provides information needed for response to a chemical incident, such as physicochemical properties, health effects and decontamination advice.

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Contents

Main points

General

1,2-dibromoethane is a non-combustible, colourless liquid with a sweet or chloroform-like odour. The chemical decomposes on heating or burning to form toxic and corrosive fumes of hydrogen bromide and bromine. It reacts vigorously with powdered aluminium, powdered magnesium, sodium, potassium, calcium, strong bases and strong oxidants, causing fire and explosion.

Health

Highly toxic; rapidly absorbed by ingestion, inhalation and skin contact.

Inhalation may cause eye, mucous membrane and respiratory tract irritation; severe exposure may cause pneumonitis and pulmonary oedema.

Ingestion may cause nausea, vomiting and diarrhoea. Ulceration of the mucosae of the mouth, throat and stomach may occur.

Inhalation, ingestion or dermal exposure can result in systemic toxicity; symptoms include CNS, respiratory, cardiovascular, metabolic, renal, and hepatic effects.

Skin contact may cause blistering, erythema, oedema and ulceration; chemical burns may follow prolonged contact.

Eye exposure may cause irritation and possibly corneal damage.

Casualty decontamination at the scene

1,2-dibromoethane can cause blisters and potentially chemical burns. Therefore, following disrobe, improvised wet decontamination should be considered.

Environment

Inform the Environment Agency where appropriate and avoid release into the environment.

Spillages, contaminated fire and decontamination run-off should be prevented from entering drains and surface and groundwaters.

Hazard identification

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

UN		1605	Ethylene dibromide	
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, contaminated fire and decontamination run-off should be prevented from entering drains and surface and groundwaters.	
APP		B	Gas-tight chemical protective clothing with breathing apparatus [note 2].	
Hazards	**Class**	6.1	Toxic substances	
	Sub-risks	-	-	
HIN		66	Highly toxic 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 conforming to BS EN 137.

Note 2: Chemical protective clothing should be gas-tight conforming to BS EN 943 part 2 in combination with breathing apparatus conforming to BS EN 137.

References

National Chemical Emergency Centre (NCEC), part of Ricardo-AEA. 'Dangerous Goods Emergency Action Code List'. 2025 (viewed on 29 January 2025)

Table 2. The GB classification, labelling and packaging (CLP) regulation for 1,2-bromoethane

Hazard class and category	Carc. 1B	Carcinogenicity, category 1B	
	Acute Tox. 3	Acute toxicity (oral, dermal, inhalation), category 3	
	Eye Irrit. 2	Eye irritation, category 2	
	STOT SE 3	Specific target organ toxicity following single exposure, category 3	
	Skin Irrit. 2	Skin irritation, category 2	
	Aquatic Chronic 2	Chronic hazards to the aquatic environment, category 2	
Hazard statement	H350	May cause cancer	
	H331	Toxic if inhaled	
	H311	Toxic in contact with skin	
	H301	Toxic if swallowed	
	H319	Causes serious eye irritation	
	H335	May cause respiratory irritation	
	H315	Causes skin irritation	

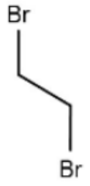
	H411	Toxic to aquatic life with long-lasting effects
Signal words	DANGER	

References

The Health and Safety Executive (HSE). ‘GB CLP Regulation’ (viewed on 29 January 2025)

Physicochemical properties

Table 3. Physicochemical properties

CAS number	106-93-4
Molecular weight	187.9
Formula	$Br(CH_2)_2Br/C_2H_4Br_2$
Common synonyms	Ethylene dibromide, EDB
State at room temperature	Colourless liquid
Volatility	Vapour pressure = 11 mmHg at 25°C
Specific gravity	2.2 (water = 1) 6.5 (air = 1)
Flammability	Non-combustible
Lower explosive limit	-
Upper explosive limit	-
Water solubility	Slightly soluble in water
Reactivity	Reacts vigorously with powdered aluminium, powdered magnesium, sodium, potassium, calcium, strong bases and strong oxidants, causing a fire and explosion hazard. Attacks some forms of plastic, rubber and coatings. Decomposes slowly in the presence of heat and light. On contact with hot surfaces or on heating or on burning the chemical decomposes forming toxic and corrosive fumes, hydrogen bromide and bromine.
Odour	Sweet or chloroform-like odour
Structure	

References

World Health Organization. International Programme on Chemical Safety ‘International Chemical Safety Card entry for ethylene dibromide’ ICSC 0045, 2012 (viewed on 29 January 2025)

PubChem. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information. ‘PubChem Compound Summary for CID 7839, 1,2-dibromoethane’ (viewed on 29 January 2025)

Reported effect levels from authoritative sources

Table 4. Exposure by inhalation of vapours

ppm	mg/m^3	Signs and symptoms	Reference
28	215	Fatal (exposures of 30 minutes or more)	a
>50	>384	Throat and nasal irritation	a

These values give an indication of levels of exposure that can cause adverse effects. They are not health protective standards or guideline values.

Table 5. Exposure by ingestion

mg/kg body weight	Signs and symptoms	Reference
140	Fatal	a

These values give an indication of levels of exposure that can cause adverse effects. They are not health protective standards or guideline values.

References
a World Health Organization. International Programme on Chemical Safety ‘Environmental Health Criteria 1,2-dibromoethane’ EHC 177, 1996 (viewed 29 January 2025)

Published emergency response guidelines

Table 6. Acute exposure guideline levels (AEGLs) (Interim)

	Concentration (ppm)				
	10 minutes	**30 minutes**	**60 minutes**	**4 hours**	**8 hours**
AEGL-1 [note 1]	52	26	17	7.1	4.6
AEGL-2 [note 2]	73	37	24	10	6.5
AEGL-3 [note 3]	170	76	46	17	10

Notes to Table 6

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.

Reference

US Environmental Protection Agency (EPA). ‘Acute Exposure Guideline Levels’ (viewed on 29 January 2025)

Exposure standards, guidelines or regulations

Table 7. Occupational standards

	LTEL (8-hour reference period)		STEL (15-min reference period)	
	ppm	mg/m^3	ppm	mg/m^3
WEL	0.5	3.9	-	-

Abbreviations

WEL = workplace exposure limit.
LTEL = long-term exposure limit.
STEL = short-term exposure limit.

Reference

Health and Safety Executive (HSE). 'EH40/2005 Workplace Exposure Limits Fourth Edition' 2020 (viewed on 29 January 2025)

Table 8. Public health standards and guidelines

Drinking water standard	No value specified
WHO guideline for drinking water quality	0.4 µg/L
UK indoor air quality guideline	No value specified
WHO indoor air quality guideline	No value specified
WHO air quality guideline	No value specified

Reference

World Health Organization. 'Guidelines for Drinking-water Quality, 4th Edition Incorporating First and Second Addendum' 2022 (viewed on 29 January 2025)

Health effects

Highly toxic; rapidly absorbed by inhalation, ingestion or skin contact. Oxidation of dibromoethane by cytochrome P450s yields 2-bromoacetaldehyde which is responsible for acute effects.

Table 9. Signs or symptoms of acute exposure

Route	Signs and symptoms
Inhalation	Inhalation may cause eye, mucous membrane and respiratory tract irritation. Severe exposure may cause pneumonitis and pulmonary oedema which may be delayed.
Ingestion	Ingestion may cause GI upset. Ulceration of the mucosae of the mouth, throat and stomach may occur.
Systemic	Systemic features may be delayed in onset and can include: CNS: dizziness, headache, agitation, delirium, drowsiness progressing to coma. Respiratory: chest pain, tachypnoea, dyspnoea which may be delayed and respiratory failure/arrest. Cardiovascular: hypotension or hypertension. Cardiac conduction abnormalities. Myocarditis has been reported rarely. Fatal cardiovascular shock may develop within 12 hours in severe cases. Metabolic: acidosis, hypoglycaemia, hyperkalaemia, hypercalcaemia and hyperphosphataemia. Coagulopathy and leukocytosis have also been reported. Renal and hepatic: Deaths occur from hepatorenal injury, toxicity may be delayed for up to 36 hours. Necrosis has been reported.
Eyes	Eye exposure may cause irritation and possibly corneal damage.
Skin	Skin contact may cause blistering, erythema, oedema and ulceration. Chemical burns may follow prolonged contact.

Reference

National Poisons Information Service (NPIS). TOXBASE'1,2-dibromoethane' 2023 (viewed on 30 January 2025)

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.

1,2-dibromoethane can cause blisters, erythema and ulceration on contact with skin. Therefore, following disrobe, improvised wet decontamination should be considered.

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 (UKHSA) Radiation, Chemicals, Climate and Environmental Hazards 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, disrobing should be conducted at the scene and by the casualty themselves. Disrobing should be systematic to prevent transfer of contaminant from clothing to skin. Clothing should not be pulled over the head if possible.

Clothing stuck to the casualty by the contaminant should not be forcefully removed, as this risks causing further harm.

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.

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.

Unprotected first responders and members of the public should not approach casualties incapacitated by exposure to administer improvised decontamination, as they may be exposed to contaminants and become a casualty themselves.

Important note: Improvised decontamination should continue until a more structured intervention, such as an Interim Operational Response is conducted, or Specialist Operational Response are present.

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 first and then rubbed, starting with the face, head, and neck, and moving down and away from the body.

Blotting and rubbing should not be too aggressive, as it could drive contamination further into the skin.

Casualties should also blow their nose to remove contaminants from the nasal cavities.

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

Improvised wet decontamination

Wet decontamination should be used if contamination with a caustic chemical substance is suspected.

Wet decontamination may be performed using copious amounts of water from any available source such as taps, showers, water bottles, fixed installation hose-reels and sprinklers to gently rinse the affected skin. Other natural sources of water may be considered unless this creates greater risks to the individuals affected. Wet wipes or baby wipes may be used as an effective alternative.

Improvised decontamination should not involve overly aggressive methods to remove contamination as this could further damage affected tissues and 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.

When vulnerable people are affected by a hazardous substance, they may need additional support to remove themselves, their clothing or the substance.

Casualties should remain in the area and should not leave to seek care at a hospital, as this presents a contamination risk. Further care will be administered on site by the appropriate emergency services.

Interim wet decontamination

Interim decontamination is the use of standard Fire and Rescue Service 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 2015 (viewed on 30 January 2025)

National Health Service England. 'Emergency Preparedness, Resilience and Response (EPRR): Guidance for the initial management of self-presenters from incidents involving hazardous materials' 2019 (viewed on 30 January 2025)

Joint Emergency Service Interoperability Programme. 'Initial Operational Response (IOR) to Incidents Suspected to Involve Hazardous Substances or CBRN Materials' 2024 (viewed on 30 January 2025)

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.

For comprehensive clinical advice consult TOXBASE directly.

Clinical decontamination following surface contamination

Avoid contaminating yourself.

Carry out decontamination after resuscitation. This should be performed in a well-ventilated area, preferably with its own ventilation system.

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 copious amounts of water under low pressure for at least 10 to 15 minutes, or until pH of skin is normal (pH of the skin is 4.5 to 6 although it may be closer to 7 in children, or after irrigation). The earlier irrigation begins, the greater the benefit.

Pay special attention to skin folds, fingernails, and ears.

Skin exposure

Decontaminate (as above) the patient following surface contamination.

Recheck 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. Attention should be paid to avoiding hypothermia during prolonged irrigation with cool fluids. Once the pH is normal and stabilised, treat as per a thermal injury.

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

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

Carry out 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 or equivalent crytalloid (for example, by an infusion bag with a giving set) for a minimum of 10 to 15 minutes irrespective of initial conjunctival pH. A Morgan Lens may be used if anaesthetic has been given.

Aim for a final conjunctival pH of 7 to 7.2. The conjunctivae may be tested with indicator paper. Retest 15 to 30 minutes intervals after irrigation and use further irrigation if necessary.

Any particles lodges in the conjunctival recesses should be removed.

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.

Carry out other supportive measures as indicated by the patient's clinical condition.

Ingestion and Inhalation

Maintain a clear airway and ensure adequate ventilation.

In the event of cardiac arrest in hospital or witnessed out of hospital cardiac arrest with prompt bystander CPR, resuscitation should be usually continued for at least 1 hour and only stopped after discussion with a senior clinician.

Prolonged resuscitation, even for several hours, may be appropriate following poisoning as recovery with good neurological outcome may occur.

Gut decontamination (including activated charcoal) is contraindicated.

Monitor vital signs and cardiac rhythm; check the capillary blood glucose.

Check and record pupil size.

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

Carry out other supportive measures as indicated by the patient's clinical condition.

Clinical decontamination and first aid references

National Poisons Information Service (NPIS). TOXBASE '1,2-dibromoethane' 2023 (viewed on 30 January 2025)

National Poisons Information Service (NPIS). TOXBASE 'chemicals splashed or sprayed into the eyes - features and clinical management' 2020 (viewed on 30 January 2025)

National Poisons Information Service (NPIS). TOXBASE 'skin decontamination - corrosives' 2020 (viewed on 30 January 2025)

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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