UK Health Security Agency

Dichloromethane

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

Dichloromethane is a combustible liquid with a sweet odour. It reacts vigorously with active metals like lithium, sodium, and potassium, as well as with strong bases. When heated, burned, or in contact with hot surfaces, it decomposes, releasing toxic and corrosive fumes such as hydrogen chloride, phosgene, and carbon monoxide.

Health

Ingestion may cause gastrointestinal burns, haemorrhage and necrosis.

Inhalation causes dyspnoea, cough, respiratory tract irritation, pulmonary oedema and pneumonitis with bilateral exudative pleural effusions.

Dermal contact causes a burning sensation, numbness, coldness and pain.

Ingestion, inhalation and extensive or prolonged dermal contact can cause systemic effects including headache, light-headedness, blurred vision, fatigue, disorientation, confusion, drowsiness, agitation, ataxia, arthropathy, rash and skin flushing.

Eye exposure to vapour can cause irritation, and with liquid may cause corneal burns.

Casualty decontamination at the scene

Following disrobe, improvised dry decontamination should be considered for an incident involving dichloromethane, unless casualties are demonstrating signs or symptoms of exposure to caustic or corrosive substances.

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 dichloromethane

UN		1593	Dichloromethane	
EAC		2Z	Use fine water spray. Wear normal fire kit 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		-	-	
Hazards	**Class**	6.1	Toxic substance	
	Sub-risks	-	-	
HIN		60	Toxic or slightly 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: Normal firefighting clothing is appropriate: self-contained open circuit positive pressure compressed air breathing apparatus conforming to BS EN 137 worn in combination with fire kit conforming to BS EN 469, fire fighters' gloves conforming to BS EN 659 and firefighters' footwear conforming to BS EN 15090 (Footwear for firefighters) type F3 - Hazmat and structural firefighting [CH – marking for chemical resistance] or alternatively firefighters' boots conforming to Home Office Specification A29 (rubber boots) or A30 (leather boots). Leather footwear including those conforming to A30 may not provide adequate chemical resistance therefore caution should be exercised in the use of these boots.

References

National Chemical Emergency Centre (NCEC), part of Ricardo-AEA. 'Dangerous Goods Emergency Action Code List'. 2025 (viewed on 27 January 2025)

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

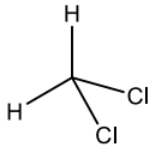
Hazard class and category	Carc. 2	Carcinogenicity, category 2	
Hazard statement	H351	Suspected of causing cancer	
Signal words	WARNING		

References

The Health and Safety Executive (HSE). 'GB CLP Regulation' (viewed on 27 January 2025)

Physicochemical properties

Table 3. Physicochemical properties

CAS number	75-09-2
Molecular weight	84.9
Formula	CH_2Cl_2
Common synonyms	Methylene chloride, DCM
State at room temperature	Liquid
Volatility	Vapour pressure = 435 mm Hg at 25 °C
Specific gravity	1.3 (water = 1) 2.9 (air = 1)
Flammability	Combustible liquid
Lower explosive limit	13%
Upper explosive limit	22%
Water solubility	Soluble in water
Reactivity	It reacts vigorously with active metals like lithium, sodium, and potassium, as well as with strong bases. It can damage certain plastics, rubber, and coatings. It also reacts with sodium-potassium alloy, nitrogen tetroxide, liquid oxygen, and titanium. When heated, burned, or in contact with hot surfaces, it decomposes, releasing toxic and corrosive fumes such as hydrogen chloride, phosgene, and carbon monoxide. The compound can explode when mixed with dinitrogen pentoxide or nitric acid, and mixtures with methanol vapour in air are flammable
Odour	Sweet, penetrating, ether-like odour
Structure	

References

World Health Organization. International Programme on Chemical Safety ‘International Chemical Safety Card entry for Dichloromethane’ ICSC 0058, 2017 (viewed on 31 January 2025)

PubChem. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information. ‘PubChem Compound Summary for CID 6344, Dichloromethane’ (viewed on 31 January 2025)

Reported effect levels from authoritative sources

Table 4. Exposure by inhalation

ppm	mg/m^3	Exposure duration	Signs and symptoms	Reference
300	1,042	No acute effects up to 7.5 hours	Odour threshold	b
300-800	1,042-2,778	40 minutes	Psychomotor and sensory impairment	b
500-1,000	1,737-3,472	1-2 hours	Light-headedness and alterations in visual reflexes	b
2,300	7,987	5 minutes	Irritation and dizziness	b
2,300	7,987	30 minutes	Nausea	b
7,200	24,290-34,700	8 – 20 minutes	Paraesthesia, congestion of the head and eye irritation	b
8,000-20,000	27,779-69,447	30 minutes-4 hours	Narcosis	b
>50,000	>173,620	Acute	Immediate danger to life or health	b

Table 5. Exposure by ingestion

mL	Signs and symptoms	Reference
25	Estimated adult fatal dose	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. Agency for Toxic Substances and Disease Registry (ATSDR). ‘Toxicological Profile for Dichloromethane ’ 2023 (viewed on 17 December 2024)

b. International Programme on Chemical Safety. Methylene Chloride. Poisons Information Monograph 343, 1997. World Health Organization: Geneva (viewed on 31 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]	290	230	200	NR	NR
AEGL-2 [note 2]	1,700	1,200	560	100	60
AEGL-3 [note 3]	12,000	8,500	6,900	4,900	2,100

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.

NR = Not recommended due to insufficient data

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/m³	ppm	mg/m³
WEL	100	353	200	706

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 30 January 2025)

Table 8. Public health standards and guidelines

Drinking water standard	No value specified
WHO guideline for drinking water quality	20 µg/L
UK indoor air quality guideline	No value specified
WHO indoor air quality guideline	No value specified
WHO air quality guideline	3 mg/m³ (24-hour guideline) 0.45 mg/m³ (weekly average concentration)

Reference

World Health Organization. 'Guidelines for Drinking-water Quality, 4th Edition Incorporating First and Second Addendum' 2022 (viewed on 30 January 2025)

World Health Organization Regional Office for Europe. 'Air Quality Guidelines for Europe, European Series, No. 91, 2nd Edition' 2000 (viewed on 30 January 2025)

Health effects

Inhalation is the most common cause of toxicity. Dichloromethane is metabolised to carbon monoxide.

Table 9. Signs or symptoms of acute exposure

Route	Signs and symptoms
Inhalation	Inhalation causes dyspnoea, cough and upper respiratory tract irritation. Pulmonary oedema and pneumonitis with bilateral exudative pleural effusions have been documented. Systemic features may also develop
Systemic	Systemic features include GI upset, headache, light-headedness, blurred vision, fatigue, confusion, drowsiness, agitation, ataxia, hypotonia, rash, arthropathy, skin flushing and diaphoresis. Cardiovascular effects include syncope, bradycardia, tachycardia, hypotension and/or hypertension. Optic neuropathy and hearing loss have been recorded. Elevated carboxyhaemoglobin concentrations are common. Metabolic acidosis, electrolyte disturbances (hypernatraemia, hypokalaemia/hyperkalaemia, hypocalcaemia), hyperglycaemia, leukocytosis, raised liver enzymes and elevated creatine phosphokinase concentration can occur. In severe cases, hypotension, respiratory depression, coma, convulsions, pulmonary and cerebral oedema, acute kidney injury, cardiac arrhythmias and cardiac arrest may occur.
Ingestion	Ingestion may cause gastrointestinal burns, haemorrhage, and necrosis. Acute pancreatitis has been reported. Systemic features may occur.
Skin	Skin contact causes a burning sensation, numbness, coldness and pain. Second- and third-degree burns have been reported. Absorption leading to systemic features may occur if exposure is prolonged or extensive.
Eye	Vapours may cause irritation. Contact with liquid methylene chloride may cause corneal burns.

Reference

National Poisons Information Service (NPIS). TOXBASE ‘Dichloromethane’ 2024 (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.

Following disrobe, improvised dry decontamination should be considered for an incident involving dichloromethane unless casualties are demonstrating signs or symptoms of exposure to caustic or corrosive substances.

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

Improvised dry decontamination should be considered for an incident involving dichloromethane unless casualties are demonstrating obvious signs of chemical burns or skin irritation.

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.

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

Cover affected area with a clean non-adherent dressing.

Chemical burns should be reviewed by a burns specialist.

If features of systemic toxicity are present, manage as per ingestion.

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

Eye 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 at 15 to 30 minutes 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, inhalation and systemic toxicity

Maintain a clear airway and ensure adequate ventilation.

Administer oxygen to achieve adequate oxygenation.

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.

In severely affected patients, especially those with tachypnoea, stridor or upper airway damage, critical care input is essential with urgent assessment of the airway. A supraglottic-epiglottic burn with erythema and oedema is usually a sign that further oedema will occur that may lead to airway obstruction.

Children are of increased risk of airway obstruction.

Do not attempt gastric lavage following ingestion.

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 'Dichloromethane' 2024 (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)

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.

This document from the UKHSA Radiation, Chemicals, Climate and Environmental Hazards Directorate reflects understanding and evaluation of the current scientific evidence as presented and referenced here.

First published: January 2016
Update of Health Effects, Decontamination at the Scene and Clinical Decontamination and First Aid sections: November 2016
Full document update: September 2021
Full document update: January 2025

For queries relating to this document, please contact chemcompendium@ukhsa.gov.uk or enquiries@ukhsa.gov.uk

Publishing reference: GOV-18186