



UK Health
Security
Agency

Carbon disulphide

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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Main points

General

Carbon disulphide is a colourless liquid that is highly flammable. It is slightly soluble in water. The pure liquid has a rather pleasant ether-like odour, while the usual commercial and reagent grades are yellowish and foul smelling (resembling decaying radishes). Carbon disulphide may decompose explosively on shock, friction and concussion and may explode on heating.

Health

Poisoning from carbon disulphide usually occurs following inhalation, but may also occur after ingestion or dermal exposure.

Inhalation causes dizziness and headache following mild exposures, anxiety and fatigue following moderate exposures, and inebriation, GI disturbances and CNS excitement followed by CNS depression in severe exposures.

Ingestion causes irritation to mucous membranes and results in nausea and vomiting.

Dermal exposure causes irritation and sensitisation, with pain and erythema, vesicle formation, blistering, exfoliation and possibly second- and third- degree burns.

Ocular exposure may be irritating to the eyes.

Casualty decontamination at the scene

Carbon disulphide may cause chemical burns on contact with the skin. 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 carbon disulphide

UN	1131	Carbon disulphide		
EAC	2WE	<p>Use fine water spray. Wear chemical protective clothing with liquid-tight connections for whole body in combination with breathing apparatus [note 1].</p> <p>Substance can be violently or explosively reactive.</p> <p>Spillages, contaminated fire and decontamination run-off should be prevented from entering drains and surface and groundwaters.</p> <p>There may be a public safety hazard outside the immediate area of the incident [note 2].</p>		
APP	A(fl)	Fire kit with gas tight chemical protective suit with breathing apparatus [note 3].		
Hazards	Class	3	Flammable liquids and desensitised liquid explosives	
	Sub-risks	6.1	Toxic substances	
HIN	336	Highly flammable liquid, toxic		

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: People should be warned to stay indoors with all doors and windows closed, preferably in rooms upstairs and facing away from the incident. Ignition sources should be






eliminated and ventilation stopped. Effects may spread beyond the immediate vicinity. All non-essential personnel should be instructed to move at least 250m away from the incident.

Note 3: Normal fire kit in combination with gas-tight chemical protective clothing 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 27 January 2025)

Table 2a. The GB classification, labelling and packaging (CLP) regulation for carbon disulphide

Hazard class and category	Flam. Liq. 2	Flammable liquid, category 2	
	Repr. 2	Reproductive toxicity, category 2	
	STOT RE 1	Specific target organ toxicity following repeated exposure, category 1	
	Eye Irrit. 2	Eye irritation, category 2	
	Skin Irrit. 2	Skin irritation, category 2	
Hazard statement	H225	Highly flammable liquid and vapour	
	H361fd	Suspected of damaging fertility. Suspected of damaging the unborn child	

	H372	Causes damage to organs through prolonged or repeated exposure
	H319	Causes serious eye irritation
	H315	Causes skin irritation
Signal words	DANGER	

Table 2b. The GB classification, labelling and packaging (CLP) regulation specific concentration limits for carbon disulphide

Concentration	Hazard class and category	Hazard statement	
$C \geq 1\%$	Repr. 2	H361fd	Suspected of damaging fertility. Suspected of damaging the unborn child
$C \geq 1\%$	STOT RE 1	H372	Causes damage to organs through prolonged or repeated exposure
$0.2\% \leq C < 1\%$	STOT RE 2	H373	May cause damage to organs through prolonged or repeated exposure

References

The Health and Safety Executive (HSE). '[GB CLP Regulation](#)' (viewed on 29 January 2025).

Physicochemical properties

Table 3. Physicochemical properties

CAS number	75-15-0
Molecular weight	76.1
Formula	CS ₂
Common synonyms	Carbon bisulphide, carbon sulphide, dithiocarbonic anhydride, carbon disulfide
State at room temperature	Colourless liquid
Volatility	Vapour pressure = 359 mmHg at 25 °C
Specific gravity Vapour density	1.26 (water = 1) 2.63 (air = 1)
Flammability	Highly flammable
Lower explosive limit	1%
Upper explosive limit	50%
Water solubility	Slightly soluble in water, 2160 mg/L at 25 °C
Reactivity	May decompose explosively on shock, friction or concussion. May explode on heating. Reacts violently with oxidants including nitrogen oxide, chlorine, permanganic acid. This generates fire and explosion hazard. Attacks some forms of plastic, rubber and coatings.
Reaction or degradation products	The substance may ignite spontaneously on contact with hot surfaces and air. This produces toxic fumes of sulfur dioxide.
Odour	Pure liquid has a rather pleasant ether-like odour, while the usual commercial and reagent grades are yellowish and foul smelling (resembling decaying radishes)
Structure	$\text{S}=\text{C}=\text{S}$

References

World Health Organization. International Programme on Chemical Safety '[International Chemical Safety Card entry for Carbon Disulphide](#)' ICSC 0022, 2000(viewed on 30 January 2025)

PubChem. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information. '[PubChem Compound Summary for CID 6348, Carbon Disulphide](#)' (viewed on 30 January 2025)

Reported effect levels from authoritative sources

Table 4. Exposure by inhalation of vapours

ppm	mg/m ³	Length of exposure	Signs and symptoms	Reference
300	933	A few days	Serious pathological changes	a
965 – 1,608	3,000 – 5,000	Acute	Psychiatric and neurological changes (eg rapid mood changes and hallucinations)	b
2,000 – 3,200	6,220 – 9,952	30 – 60 minutes	Mild intoxication, paraesthesia and irregular breathing	c
4,800	14,928	Acute	Unconsciousness	c
5,000	15,500	Acute	Rapidly 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. National Poisons Information Service (NPIS). TOXBASE '[carbon disulphide](#)' 2020 (viewed on 27 January 2025)

b. World Health Organization. International Programme on Chemical Safety '[International Chemical Safety Card entry for Carbon Disulphide](#)' EHC 10, 1979 (viewed on 27 January 2025)

c. World Health Organization. International Programme on Chemical Safety '[International Chemical Safety Card entry for Carbon Disulphide](#)' ICSC 0022, 1993 (viewed on 27 November 2024)

Published emergency response guidelines

Table 5. Acute exposure guideline levels (AEGLs)

	Concentration (ppm)				
	10 minutes	30 minutes	60 minutes	4 hours	8 hours
AEGL-1 [note 1]	17	17	13	8.4	6.7
AEGL-2 [note 2]	200	200	160	100	50
AEGL-3 [note 3]	600	600	480	300	150

Notes to Table 5

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 27 January 2024)

Exposure standards, guidelines or regulations

Table 6. Occupational standards

	LTEL (8-hour reference period)		STEL (15-min reference period)	
	ppm	mg/m ³	ppm	mg/m ³
WEL	5	15	-	-

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 27 November 2024)

Table 7. Public health standards and guidelines

Drinking water standard	No value specified
WHO guideline for drinking water quality	No value specified
UK indoor air quality guideline	No value specified
WHO indoor air quality guideline	No value specified
WHO air quality guideline	100 µg/m ³ with an averaging period of 24 hours 20 µg/m ³ with an averaging period of 30 minutes

Reference

World Health Organization Regional Office for Europe. '[Air Quality Guidelines for Europe, European Series, No. 91, 2nd Edition](#)' 2000 (viewed on 27 November 2024)

Health effects

Highly toxic, poisoning from carbon disulphide usually occurs after inhalation, but may also occur after dermal exposure or ingestion.

Table 8. Signs or symptoms of acute exposure

Route	Signs and symptoms
Inhalation	<p>Mild exposure results in dizziness and headache; moderate exposure in anxiety and fatigue. Severe exposure in inebriation, gastrointestinal disturbances and CNS excitement followed by CNS depression, with stupor, confusion, hallucinations, restlessness, unconsciousness, polyneuritis, tremors, and headache. Exposure to high concentrations may result in dyspnoea and chest pain; respiratory failure may follow.</p> <p>ECG abnormalities such as changes in the P wave, S-T segment depression and T wave inversion have been reported.</p>
Ingestion	<p>May cause irritation to mucous membranes resulting in nausea and vomiting. Symptoms can include respiratory difficulty, cyanosis, tremor, enlarged pupils, convulsions, collapse, coma, Cheyne-Stokes respiration, respiratory paralysis, and death.</p>
Dermal	<p>Dermal contact with carbon disulphide can lead to skin irritation and sensitisation.</p> <p>Exposure to high concentrations can cause skin burns. Dermal exposure has resulted in burning pain and erythema, with vesicle formation, blistering, exfoliation and possibly second- and third- degree burns. When absorbed through the skin, symptoms similar to those seen after inhalation may occur.</p>
Eyes	<p>Carbon disulphide liquid may be irritating to the eyes.</p> <p>Retinopathy (including small retinal haemorrhages and microaneurysm of the fundus) has been reported following gaseous exposure.</p>

Reference

National Poisons Information Service (NPIS). TOXBASE '[carbon disulphide](#)' 2020 (viewed on 27 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.

Carbon disulphide may cause chemical burns on contact with the skin. Therefore, following disrobe, improvised wet decontamination should be considered (see below for details).

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 27 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 27 January 2025)

Joint Emergency Service Interoperability Programme. ['Initial Operational Response \(IOR\) to Incidents Suspected to Involve Hazardous Substances or CBRN Materials'](#) 2024 (viewed on 27 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

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 soap and 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.

Treat burns as per a thermal injury.

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

Chemical burns should be reviewed by a burns specialist. Excision or skin grafting may be required.

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

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 crystalloid (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 neutral 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 lodged 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.

Inhalation

Maintain a clear airway and ensure adequate ventilation.

If appropriate, remove from exposure.

Administer oxygen to achieve adequate oxygenation.

Monitor vital signs and 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.

Ingestion

Do not attempt gastric lavage.

Monitor vital signs and 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 [‘carbon disulphide’](#) 2020 (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 27 January 2025)

National Poisons Information Service (NPIS). TOXBASE [‘skin decontamination - irritants’](#) 2019 (viewed on 27 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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