



UK Health
Security
Agency

Xylene

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

Xylene is a colourless, flammable liquid at room temperature. Reacts with strong acids and reacts violently with strong oxidisers. When heated to decomposition, emits acrid smoke and fumes. Above 30°C, explosive vapour/air mixtures may be formed.

Health

Toxic by all routes of exposure.

Inhalation causes irritation of the nose, throat and respiratory tract.

Ingestion causes oropharyngeal and gastric irritation with nausea and vomiting.

Eye exposure causes irritation, conjunctivitis, blepharospasm and transient superficial corneal damage.

Skin contact will cause irritation and erythema with possibly necrosis if contact is prolonged.

Systemic features include nausea, vomiting, dizziness, headache, vertigo, anorexia, confusion, drowsiness, dysarthria, ataxia, deafness, respiratory depression and coma. Pulmonary oedema, cyanosis, convulsions, metabolic acidosis, hypokalaemia, acute liver or kidney injury may occur. Cardiac features include cardiomyopathy, ventricular dysrhythmias, ventricular fibrillation, cardiac arrest and myocardial infarction.

Casualty decontamination at the scene

Following disrobe, improvised dry decontamination should be considered for an incident involving xylene 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 and contaminated fire and decontamination run-off should be prevented from entering drains and surface and groundwaters.

Hazard identification

Table 1a. Standard (UK) dangerous goods emergency action codes for xylene (packaging group II)

UN		1307	Xylenes (packaging group II)	
EAC		3YE	<p>Use normal foam, i.e., protein-based foam that is not alcohol resistant.</p> <p>Wear normal fire kit in combination with breathing 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		-	-	
Hazards	Class	3	Flammable liquids	
	Sub-risks	-	-	
HIN		33	Highly flammable liquid (flash point below 23°C)	

Abbreviations

UN = United Nations number.

EAC = emergency action code.

APP = additional personal protection.

HIN = hazard identification number.

Notes to Table 1a


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.

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 250 m away from the incident.

References

National Chemical Emergency Centre (NCEC), part of Ricardo-AEA. '[Dangerous Goods Emergency Action Code List](#)'. 2023 (viewed on 22 November 2024)

Table 1b. Standard (UK) dangerous goods emergency action codes for xylene (packaging group III)

UN		1307	Xylenes (packaging group III)	
EAC		3Y	<p>Use normal foam, i.e., protein based foam that is not alcohol resistant.</p> <p>Wear normal fire kit in combination with breathing 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>	
APP		-	-	
Hazards	Class	3	Flammable liquids	
	Sub-risks	-	-	
HIN		30	Flammable liquid (flash point between 23°C and 60°C inclusive) or flammable liquid or solid in the molten state with a flash point above 60°C, heated to a temperature equal to or above its flash point, or self-heating liquid.	

Abbreviations

UN = United Nations number.

EAC = emergency action code.

APP = additional personal protection.

HIN = hazard identification number.

Notes to Table 1b




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](#)'. 2023 (viewed on 22 November 2024)

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

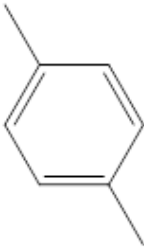
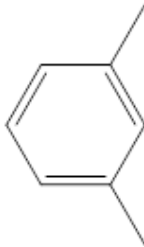
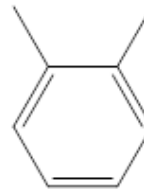
Hazard class and category	Flam. Liq. 3	Flammable liquids, category 3	
	Acute Tox. 4	Acute toxicity (dermal, inhalation), category 4	
	Skin Irrit. 2	Skin irritation, category 2	
Hazard statement	H226	Flammable liquid and vapour	
	H312	Harmful in contact with skin	
	H315	Causes skin irritation	
	H332	Harmful if inhaled	
Signal words	WARNING		

References

The Health and Safety Executive (HSE). '[GB CLP Regulation](#)' (viewed on 22 November 2024)

Physicochemical properties

Table 3. Physicochemical properties

CAS number	1330-20-7
Molecular weight	106.17
Formula	C ₈ H ₁₀
Common synonyms	Dimethylbenzene, xylol, methyltoluene (o-xylene, m-xylene, p-xylene)
State at room temperature	Colourless liquid
Volatility	Vapour pressure = 0.7 kPa at 20°C
Specific gravity	0.86 (water = 1) 3.7 (air)
Flammability	Flammable
Lower explosive limit	0.9%
Upper explosive limit	6.7%
Water solubility	Practically insoluble
Reactivity	Reacts with strong acids. Reacts violently with strong oxidisers. When heated to decomposition, emits acrid smoke and fumes. Above 30°C, explosive vapour/air mixtures may be formed.
Odour	Sweet odour
Structure	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>para-</p>  </div> <div style="text-align: center;"> <p>meta-</p>  </div> <div style="text-align: center;"> <p>ortho-</p>  </div> </div>

References

World Health Organization. International Programme on Chemical Safety '[International Chemical Safety Card entry for o-Xylene](#)' ICSC 0084, 2002 (viewed on 22 November 2024)

PubChem. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information. '[PubChem Compound Summary for Xylene](#)' (viewed on 22 November 2024)

Reported effect levels from authoritative sources

Table 4. Exposure by inhalation of vapours

ppm	mg/m ³	Duration	Signs and symptoms	Reference
50	215	2 hours	Breathing difficulty	d
110	480	Acute	Eye, nose and throat irritation	a
690	3,000	15 mins	Dizziness (p-xylene)	b
700	3,065	1 hour	Headache, nausea, dizziness, vertigo, vomiting and irritation of the eyes, nose and throat.	b
10,000	43,500	Acute	Loss of consciousness	c

Note: These values relate to xylene isomer mixtures unless otherwise stated.

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 (WHO). '[Xylenes in Drinking-water](#)' 2003. (viewed 22 November 2024)
- b. International Programme on Chemical Safety (IPCS). WHO. '[Environmental Health Criteria 190 – Xylenes](#)' 1997. (viewed 22 November 2024)
- c. National Poisons Information Service (NPIS). TOXBASE. '[Xylene](#)' 2020. (viewed 22 November 2024)
- d. Agency for Toxic Substances and Disease Registry (ATSDR). '[Toxicological Profile for Xylene](#)' 2014. (viewed 22 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]	130	130	130	130	130
AEGL-2 [note 2]	2,500 [note 4]	1,300 [note 4]	920 [note 4]	500	400
AEGL-3 [note 3]	7,200 [note 5]	3,600 [note 4]	2,500 [note 4]	1,300 [note 4]	1,000 [note 4]

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.

Note 4: Values are greater than 10% of the Lower Explosive Limit (LEL). At these concentrations, safety considerations against the hazard of explosions must be taken into account.

Note 5: Value is greater than 50% of the LEL. At this concentration, extreme safety considerations against the hazard of explosions must be taken into account.

LEL = 9,000 ppm.

Reference

US Environmental Protection Agency (EPA). '[Acute Exposure Guideline Levels](#)' 2024 (viewed on 22 November 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	50	220	100	441

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 22 November 2024)

Table 7. Public health standards and guidelines

Drinking water standard	No value specified
WHO guideline for drinking water quality	0.5 mg/L
UK indoor air quality guideline	100 µg/m ³
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 22 November 2024)

Public Health England. '[Indoor Air Quality Guidelines for selected Volatile Organic Compounds \(VOCs\) in the UK](#)' 2019 (viewed on 22 November 2024)

World Health Organization Regional Office for Europe. '[Air Quality Guidelines for Europe, European Series, No. 91, 2nd Edition](#)' 2000 (viewed on 22 November 2024)

Health effects

Xylene is highly toxic. It is readily absorbed via the lungs, and can also be absorbed through the GI tract and skin.

Systemic toxicity may occur through all routes of exposure.

Table 8. Signs or symptoms of acute exposure

Route	Signs and symptoms
Inhalation	Causes irritation of the nose, throat and respiratory tract. Systemic features may develop. High concentration exposures will lead to hypoxia. Olfactory fatigue is reported.
Ingestion	Causes oropharyngeal and severe gastric irritation with burning sensation in the throat, nausea and vomiting. Systemic features may ensue. Pulmonary aspiration can cause pneumonitis and acute lung injury/acute respiratory distress syndrome (ARDS).
Eyes	Will cause irritation, conjunctivitis, blepharospasm and transient superficial corneal damage. Injuries to the ocular surface resemble those due to alkali exposures, with significant loss of corneal and conjunctival epithelium.
Dermal	Will cause irritation and erythema with possibly necrosis if contact is prolonged.
Systemic	Symptoms include nausea, vomiting, dizziness, headache, vertigo, anorexia, confusion, drowsiness, dysarthria, ataxia, deafness, respiratory depression and coma. Pulmonary oedema, cyanosis, convulsions, metabolic acidosis, hypokalaemia, acute liver or kidney injury may occur. Cardiac features include cardiomyopathy, ventricular dysrhythmias, ventricular fibrillation, cardiac arrest and myocardial infarction.

Reference

National Poisons Information Service (NPIS). TOXBASE '[Xylene](#)' 2020 (viewed on 22 November 2024)

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 xylene 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 more structured interventions such as Interim or Specialist Operational Response are present.

Improvised dry decontamination

Improvised dry decontamination should be considered for an incident involving xylene 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 24 October 2024)

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 24 October 2024)

Joint Emergency Service Interoperability Programme. [‘Initial Operational Response IOR to Incidents Suspected to Involve Hazardous Substances or CBRN Materials’](#) 2024 (viewed on 24 October 2024)

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 in a well-ventilated area, preferably with its own ventilation system.

The patient should remove soiled clothing and wash him/herself if possible.

Contaminated clothing should be removed, double-bagged, sealed and stored safely to prevent escape of volatile substances.

Decontaminate open wounds first and avoid contamination of unexposed skin. Wash hair and all contaminated skin with liberal amounts of water (preferably warm) and soap.

Pay special attention to skin folds, fingernails and ears.

Dermal exposure

Decontaminate (as above) the patient following surface contamination.

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

Chemical 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. Excision or skin grafting may be required.

Other 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.

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

Ingestion

Remove the patient from exposure.

Gut decontamination (including activated charcoal) is contraindicated.

Maintain a clear airway and ensure adequate ventilation.

Administer oxygen to achieve adequate oxygenation.

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.

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

Inhalation

Remove the patient from exposure.

Maintain a clear airway and ensure adequate ventilation.

Administer oxygen to achieve adequate oxygenation.

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.

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

Clinical decontamination and first aid references

National Poisons Information Service (NPIS). TOXBASE ['Xylene'](#) 2020 (viewed on 22 November 2024)

National Poisons Information Service (NPIS). TOXBASE [‘Chemicals Splashed or Sprayed into the Eyes - features and clinical management’](#) 2020 (viewed on 22 November 2024)

National Poisons Information Service (NPIS). TOXBASE [‘Skin decontamination - solvents’](#) 2019 (viewed on 22 November 2024)

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.

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