



UK Health
Security
Agency

Acetylene

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.....	3
General.....	3
Health	3
Casualty decontamination at the scene.....	3
Environment	3
Hazard identification	4
Physicochemical properties	7
Reported effect levels from authoritative sources	8
Published emergency response guidelines.....	9
Exposure standards, guidelines or regulations	10
Health effects	11
Decontamination at the scene.....	12
Chemical specific advice	12
Clinical decontamination and first aid.....	13
Important notes	13
Dermal or ocular exposure	13
Inhalation.....	13
Clinical decontamination and first aid references	14
About the UK Health Security Agency	15

Main points

General

Acetylene is extremely flammable gas with garlic like odour due to presence of impurities. It reacts violently with oxidants and with fluorine or chlorine under influence of light.

Acetylene can form explosive mixtures with air; decomposes on heating and increasing pressure, causing fire and explosion hazard.

Health

A simple asphyxiant, low dose exposures are unlikely to cause toxicity.

Asphyxia symptoms include euphoria, agitation, decreased alertness, slurred speech, decreased visual acuity, memory loss, nausea, vomiting, flushing and headache.

Prolonged or high-level exposures may result in respiratory depression, hypotension, myocardial infarction, cardiac dysrhythmias, pulmonary oedema, convulsions, coma and death.

Direct contact with skin and eyes with liquefied gases directly from container may cause cold burns and frostbite.

Casualty decontamination at the scene


Decontamination should not be necessary following exposure to acetylene as it exists as a gas at room temperature. Acetylene is stored as a liquid under pressure in cylinders; this liquid will rapidly volatilise if released, though it may cause thermal burns on contact with skin.

Environment

Inform the [Environment Agency](#) where appropriate and avoid release into the environment.

Hazard identification

Table 1a. Standard (UK) dangerous goods emergency action codes for acetylene, dissolved

UN		1001	Acetylene, dissolved	
EAC		2SE	Use fine water spray. Wear normal fire kit in combination with breathing apparatus [note 1]. Substance can be violently or explosively reactive. Where there is an immediate threat to people, spillages and decontamination run-off may be washed to drains with large quantities of water [note 2] There may be a public safety hazard outside the immediate area of the incident. [note 3]	
APP		-	-	
Hazards	Class	2.1	Flammable gases	
	Sub-risks	-	-	
HIN		239	Flammable gas, which can spontaneously lead to violent reaction	

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: In such cases due care must be exercised to avoid unnecessary pollution of surface and groundwaters and wherever possible control measures such as the sealing of drains should be employed.

Note 3: 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.

Table 1b. Standard (UK) dangerous goods emergency action codes for acetylene, solvent free

UN		3374	Acetylene, solvent free	
EAC		2SE [note 1]	Use fine water spray. Wear normal fire kit in combination with breathing apparatus [note 2]. Substance can be violently or explosively reactive. Where there is an immediate threat to people, spillages and decontamination run-off may be washed to drains with large quantities of water [note 3] There may be a public safety hazard outside the immediate area of the incident. [note 4]	
APP		-	-	
Hazards	Class	2.1	Flammable gases	
	Sub-risks	-	-	
HIN				

Abbreviations

UN = United Nations number.

EAC = emergency action code.

APP = additional personal protection.

HIN = hazard identification number.

Notes to Table 1b

Note 1: Not applicable to the carriage of dangerous goods under the Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID), and the Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR).

Note 2: Normal firefighting clothing is appropriate i.e., 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 3: In such cases due care must be exercised to avoid unnecessary pollution of surface and groundwaters and wherever possible control measures such as the sealing of drains should be employed.

Note 4: 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 01 October 2024)

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

Hazard class and category	Press Gas	Gas under pressure	
	Flam. Gas 1	Flammable gas, category 1	
Hazard statement	H220	Extremely flammable gas	
Signal words	DANGER		

References

The Health and Safety Executive (HSE). '[GB CLP Regulation](#)' (viewed on 01 October 2024).

Physicochemical properties

Table 3. Physicochemical properties

CAS number	74-86-2
Molecular weight	26.0
Formula	C ₂ H ₂
Common synonyms	Ethine, Ethyne
State at room temperature	Gas
Volatility	Vapour pressure; 4,460 kPa at 200C
Specific gravity	0.9 (air =1)
Flammability	Extremely flammable
Lower explosive limit	2.5%
Upper explosive limit	100%
Water solubility	Slightly soluble in water
Reactivity	Will form explosive mixtures with air. Decomposes on heating and increased pressure, causing fire and explosion hazard. Strong reducing agent, reacts violently with oxidants and with fluorine or chlorine under influence of light, causing fire and explosion hazard.
Reaction or degradation products	Reacts with copper, silver, and mercury or their salts, forming shock-sensitive compounds (acetylides)
Odour	Garlic-like or unpleasant odour due to trace impurities
Structure	$\text{H}-\text{C}\equiv\text{C}-\text{H}$

References

World Health Organization. International Programme on Chemical Safety '[International Chemical Safety Card entry for Acetylene](#)' 0089, 2003 (viewed on 02 October 2024)

PubChem. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information. '[PubChem Compound Summary for CID 6326 Acetylene](#)' (viewed on 01 October 2024)

Reported effect levels from authoritative sources

Acetylene is a simple asphyxiant. Effects from displacement of oxygen in the air would be expected as with other asphyxiants.

Published emergency response guidelines

Table 4. Acute exposure guideline levels (AEGLs)

	Concentration (ppm)				
	10 minutes	30 minutes	60 minutes	4 hours	8 hours
AEGL-1 [note 1]	No values specified				
AEGL-2 [note 2]					
AEGL-3 [note 3]					

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 values specified			

Abbreviations

WEL = workplace exposure limit.

LTEL = long-term exposure limit.

STEL = short-term exposure limit.

Table 6. Public health standards and guidelines

Drinking water standard	No values specified
WHO guideline for drinking water quality	No values specified
UK indoor air quality guideline	No values specified
WHO indoor air quality guideline	No values specified
WHO air quality guideline	No values specified

Health effects

Inhalation is the main route of exposure. Asphyxiant gases act mainly by displacing oxygen from the atmosphere; this reduces the oxygen concentration in inspired air leading to hypoxaemia. Symptoms and signs of toxicity depend on duration of exposure, concentration, respiratory effort, and individual susceptibility (e.g. cardiac conditions, age).

Low dose accidental exposures are unlikely to cause toxicity.

Table 7. Signs or symptoms of acute exposure

Route	Signs and symptoms
Inhalation	<p>Features include euphoria, agitation, decreased alertness, slurred speech, decreased visual acuity, memory loss, nausea, vomiting, flushing and headache. Increased respiratory rate and tachycardia are often early compensatory features. Ataxia, paraesthesia and progressive impairment of consciousness may develop.</p> <p>Respiratory depression, hypotension, myocardial infarction, cardiac dysrhythmias, pulmonary oedema, convulsions, coma and death may occur if exposure is prolonged or if inhaled concentrations are high.</p> <p>In high concentrations loss of consciousness and hypoxia can develop within minutes.</p>
Dermal or ocular	<p>Direct skin and eye contact with liquefied gases directly from container may cause cold burns and frostbite.</p>

Reference

National Poisons Information Service (NPIS). TOXBASE '[Acetylene](#)' 2022 (viewed on 02 October 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.

Decontamination should not be necessary following exposure to acetylene as it exists as a gas at room temperature. Acetylene is stored as a liquid under pressure in cylinders; this liquid will rapidly volatilise if released, though it may cause thermal burns on contact with skin.

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

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

Decontamination is unlikely to be required for exposure to acetylene as it exists as a gas at room temperature.

Dermal or ocular exposure

Treat dermal and cold injuries conventionally.

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

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 bystander CPR, resuscitation should be continued for at least 1 hour and only stopped after discussion with senior clinician.

Prolonged resuscitation for cardiac arrest is recommended following poisoning as recovery with good neurological outcome may occur.

Administer oxygen to achieve adequate oxygenation.

Monitor vital signs and check capillary blood sugar.

Check and record pupil size.

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

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

Clinical decontamination and first aid references

National Poisons Information Service (NPIS). TOXBASE '[Acetylene](#)' 2022 (viewed on 02 October 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 and Environment Directorate reflects understanding and evaluation of the current scientific evidence as presented and referenced here.

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