



# Acetylene

## Incident Management

### Key Points

#### Fire

- extremely flammable gas
- reacts violently with oxidants and with fluorine or chlorine under influence of light
- will form explosive mixtures with air; decomposes on heating and increased pressure, causing fire and explosion hazard
- in the event of a fire involving acetylene, use fine water spray and normal fire kit with breathing apparatus

#### Health

- a simple asphyxiant, low dose exposures 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


#### Environment

- avoid release to the environment; inform the Environment Agency of substantial incidents


## Hazard Identification

### Standard (UK) dangerous goods emergency action codes



#### *Acetylene, dissolved*

<b>UN</b>		1001	Acetylene, dissolved	
<b>EAC</b>		2SE	Use fine water spray. Wear normal fire kit in combination with breathing apparatus*. Danger that the substance can be violently or explosively reactive. Spillages and decontamination run-off may be washed to drains with large quantities of water. Due care must, however, still be exercised to avoid unnecessary pollution to watercourses. There may be a public safety hazard outside the immediate area of the incident†	
<b>APP</b>		-	-	
<b>Hazards</b>	<b>Class</b>	2.1	Flammable gases	
	<b>Sub-risks</b>	-	-	
<b>HIN</b>		239	Flammable gas, which can spontaneously lead to violent reaction	
<p>UN – United Nations number, EAC – emergency action code, APP – additional personal protection, HIN – hazard identification number</p> <p>* Normal firefighting clothing is appropriate, i.e. breathing apparatus conforming to BS EN 137 worn in combination with fire kit conforming to BS EN 469, firefighters' gloves conforming to BS EN 659 and firefighters' boots conforming to home office specification A29 or A30</p> <p>† People should stay indoors with windows and doors closed, ignition sources should be eliminated and ventilation stopped. Non-essential personnel should move at least 250 m away from the incident.</p> <p><b>Reference</b>          Dangerous Goods Emergency Action Code List, National Chemical Emergency Centre (NCEC) Part of Ricardo-AEA. The Stationery Office, 2017.</p>				

**Acetylene, Solvent free**

<b>UN</b>		3374	Acetylene, solvent free	
<b>EAC</b>		2SE <sup>(1)</sup>	Use fine water spray. Wear normal fire kit in combination with breathing apparatus*. Danger that the substance can be violently or explosively reactive. Spillages and decontamination run-off may be washed to drains with large quantities of water. Due care must, however, still be exercised to avoid unnecessary pollution to watercourses. There may be a public safety hazard outside the immediate area of the incident <sup>†</sup>	
<b>APP</b>		-	-	
<b>Hazards</b>	<b>Class</b>	2.1	Flammable gases	
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**Classification, labelling and packaging (CLP)\*****Acetylene**

<b>Hazard class and category</b>	Press Gas	Gas under pressure	
	Flam. Gas 1	Flammable gas, category 1	
<b>Hazard statement</b>	H220	Extremely flammable gas	
<b>Signal words</b>	Danger		
* Implemented in the EU on 20 January 2009			
<b>Reference</b>			
European Commission. Harmonised classification – Annexe VI to Regulation (EC) No. 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures. <a href="http://echa.europa.eu/information-on-chemicals/cl-inventory-database">http://echa.europa.eu/information-on-chemicals/cl-inventory-database</a> (accessed 08/2018).			

## Physicochemical Properties

<b>CAS number</b>	74-86-2
<b>Molecular weight</b>	26.0
<b>Formula</b>	C <sub>2</sub> H <sub>2</sub>
<b>Common synonyms</b>	Ethine, Ethyne
<b>State at room temperature</b>	Gas
<b>Volatility</b>	Vapour pressure; 4,460 kPa at 20°C
<b>Specific gravity</b> <b>Vapour density</b>	0.9 (air = 1)
<b>Flammability</b>	Extremely flammable
<b>Lower explosive limit</b>	2.5 %
<b>Upper explosive limit</b>	100 %
<b>Water solubility</b>	Slightly soluble in water
<b>Reactivity</b>	Will form explosive mixtures with air. Decomposes on heating and increased pressure, causing fire and explosion hazard. Strong reducing agent and reacts violently with oxidants and with fluorine or chlorine under influence of light, causing fire and explosion hazard
<b>Reaction or degradation products</b>	Reacts with copper, silver, and mercury or their salts, forming shock-sensitive compounds (acetylides)
<b>Odour</b>	Garlic-like or unpleasant odour due to trace impurities
<b>Structure</b>	$\text{H}-\text{C}\equiv\text{C}-\text{H}$
<b>References</b> Acetylene (IBM HAZARDTEXT ®) In: IBM Micromedex® TOMES® System (electronic version). Truven Health Analytics, Greenwood Village, Colorado, USA. Available at: <a href="http://www.micromedexsolutions.com/">http://www.micromedexsolutions.com/</a> (accessed 08/2018). Hazardous Substances Data Bank. Acetylene HSDB No. 166 (last revision date 04/09/2014). US National Library of Medicine: Bethesda MD. <a href="http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB">http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB</a> (accessed 08/2018) International Programme on Chemical Safety. International Chemical Safety Card entry for Acetylene. ICSC 0089, 2003. World Health Organization: Geneva.	

## 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

### Emergency response planning guideline (ERPG) values

	Listed value (ppm)	Calculated value (mg/m <sup>3</sup> )
ERPG-1*	Data not available	
ERPG-2 <sup>†</sup>		
ERPG-3 <sup>‡</sup>		

### Acute exposure guideline levels (AEGLs)

	ppm				
	10 min	30 min	60 min	4 hours	8 hours
AEGL-1*	Data not available				
AEGL-2 <sup>†</sup>					
AEGL-3 <sup>‡</sup>					

## Exposure Standards, Guidelines or Regulations

### Occupational standards

	LTEL (8-hour reference period)		STEL (15-min reference period)	
	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
<b>WEL</b>	No guideline value specified			
WEL – workplace exposure limit, LTEL – long-term exposure limit, STEL – short-term exposure limit				

### Public health guidelines

<b>Drinking water standard</b>	Guideline values not given
<b>Air quality guideline</b>	
<b>Soil guideline values and health criteria values</b>	



## Health Effects

### Major route of exposure

- inhalation

### Immediate signs or symptoms of acute exposure

Route	Signs and symptoms
<b>Inhalation</b>	<p>This gas is a simple asphyxiant. Low dose accidental exposures are unlikely to cause toxicity</p> <p>Signs and symptoms depend on the duration of exposure, concentration, respiratory levels, and individual susceptibilities</p> <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>
<b>Dermal/Ocular</b>	Direct skin and eye contact with liquefied gases directly from container may cause cold burns and frostbite
<p><b>Reference</b></p> <p>TOXBASE. Acetylene, 09/2016. <a href="http://www.toxbase.org">http://www.toxbase.org</a> (accessed 08/2018)</p> <p>TOXBASE: Asphyxiant gases – features and management, 09/2016. <a href="http://www.toxbase.org">http://www.toxbase.org</a> (accessed 08/2018)</p>	

## Decontamination at the Scene

### Summary

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 Public Health England (Centre for Radiation, Chemical and Environmental Hazards) 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 people individually.

Detailed information on clinical management can be found on TOXBASE – [www.toxbase.org](http://www.toxbase.org).

### Important note

- decontamination is unlikely to be required for acetylene

### Dermal/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 a senior clinician.
- prolonged resuscitation for cardiac arrest is recommended following poisoning as recovery with good neurological outcome may occur
- give high flow oxygen to symptomatic patients
- monitor vital signs and check capillary blood sugar
- perform a 12 lead ECG in all patients who require assessment
- other supportive measures as indicated by the patient's clinical condition

### Health effects and decontamination references

TOXBASE	<a href="http://www.toxbase.org">http://www.toxbase.org</a> (accessed 08/2018)
TOXBASE	Acetylene, 09/2016
TOXBASE	Asphyxiant gases – features and management, 09/2016

This document from the PHE Centre for Radiation, Chemical and Environmental Hazards reflects understanding and evaluation of the current scientific evidence as presented and referenced here.

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