



# Pyridine

## Incident Management

### Key Points

#### Fire

- highly flammable
- emits an unpleasant fish-like odour
- reacts violently with various acids and is incompatible with strong oxidisers
- emits toxic fumes of cyanide, nitrogen oxides, carbon monoxide and carbon dioxide when heated to decomposition
- in the event of a fire involving pyridine, use alcohol-resistant foam or fine water spray and liquid-tight chemical protective clothing with breathing apparatus

#### Health


- inhalation causes irritation of eyes, nose and throat, vomiting, headache and dizziness
- ingestion causes nausea, vomiting, abdominal pain, diarrhoea, headache and pulmonary oedema
- dermal exposure can lead to irritation, photosensitisation and contact dermatitis
- inhalation, ingestion or prolonged skin contact can lead to systemic toxicity
- symptoms of systemic toxicity include CNS depression, nervousness, vertigo, agitation, insomnia, fatigue, peripheral neuritis and weakness and, in severe cases, coma and respiratory depression

#### Environment



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

## Hazard Identification

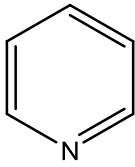
### Standard (UK) dangerous goods emergency action codes

<b>UN</b>		1282	Pyridine	
<b>EAC</b>		•2WE	Use alcohol-resistant foam but, if not available, fine water spray can be used. Wear chemical protective clothing with liquid-tight connections for whole body in combination with breathing apparatus*. Danger that the substance can be violently or explosively reactive. Spillages and decontamination run-off should be prevented from entering drains and surface and groundwaters. There may be a public safety hazard outside the immediate area of the incident <sup>†</sup>	
<b>APP</b>		A (fl)	Gas-tight chemical protective suit with breathing apparatus Flammable liquid <sup>‡</sup>	
<b>Hazards</b>	<b>Class</b>	3	Flammable liquids	
	<b>Sub-risks</b>	–	–	
<b>HIN</b>		33	Highly flammable liquid (flash point below 23°C)	
<p>UN – United Nations number, EAC – emergency action code, APP – additional personal protection, HIN – hazard identification number</p> <p>* 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 BS EN137</p> <p><sup>†</sup> 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><sup>‡</sup> Normal fire kit in combination with gas tight chemical protective clothing conforming to BS EN 943 part 2, thermal-resistant gloves should be worn such as those conforming to BS EN 511: 2006 or BS EN 407: 2004</p> <p><b>Reference</b> Dangerous Goods Emergency Action Code List, National Chemical Emergency Centre (NCEC), Part of Ricardo-AEA, The Stationery Office, 2015.</p>				

**Classification, labelling and packaging (CLP)\***

<b>Hazard class and category</b>	Flam. Liq. 2	Flammable liquid, category 2	
	Acute Tox. 4	Acute toxicity (oral, dermal, inhalation), category 4	
<b>Hazard statement</b>	H225	Highly flammable liquid and vapour	
	H302	Harmful if swallowed	
	H312	Harmful in contact with skin	
	H332	Harmful if inhaled	
<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 05/2015).			

## Physicochemical Properties

<b>CAS number</b>	110-86-1
<b>Molecular weight</b>	79.10
<b>Formula</b>	C <sub>5</sub> H <sub>5</sub> N
<b>Common synonyms</b>	Azabenzene, azine
<b>State at room temperature</b>	Colourless or yellow liquid
<b>Volatility</b>	Vapour pressure = 20 mmHg at 25°C, heavier than air
<b>Specific gravity</b>	1.03 (air = 1)
<b>Flammability</b>	Flammable
<b>Lower explosive limit</b>	1.8%
<b>Upper explosive limit</b>	12.4%
<b>Water solubility</b>	Miscible
<b>Reactivity</b>	It reacts violently with chlorosulphonic acid, chromic acid, maleic anhydride, nitric acid, perchromate, beta-propiolactone, silver perchlorate and sulphuric acid. Pyridine is incompatible with strong oxidisers
<b>Reaction or degradation products</b>	Decomposes on burning to liberate toxic fumes of nitrogen oxides, carbon monoxide, carbon dioxide and hydrogen cyanide
<b>Odour</b>	Disagreeable (fish-like) odour
<b>Structure</b>	
<b>References</b> Hazardous Substances Data Bank [Internet]. Bethesda (MD): National Library of Medicine (US); [Last Revision Date 24/06/2005]. Pyridine; Hazardous Substances Databank Number: 118. Available from: <a href="http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB">http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB</a> (assessed 05/2015). International Programme for Chemical Safety (IPCS). International Chemical Safety Card entry for pyridine, ISCS 0323, 2000. World Health Organization: Geneva. Pyridine (HAZARDTEXT® Hazard Management). In: Klasco RK (Ed): TOMES® System, Truven Healthcare Analytics Inc., Greenwood Village, Colorado, USA. (electronic version).RightAnswer.com,Inc.,Midland,MI, USA, Available at: <a href="http://www.rightanswerknowledge.com">http://www.rightanswerknowledge.com</a> (assessed 05/2015).	

## Reported Effect Levels from Authoritative Sources

### Exposure by inhalation

g/kg bw	Signs and symptoms	Reference
0.5–5	Estimated fatal dose	a
<p>These values give an indication of levels of exposure that can cause adverse effects. They are not health protective standards or guideline values</p> <p><b>Reference</b></p> <p>a TOXBASE. Pyridine, 2007. <a href="http://www.toxbase.org">http://www.toxbase.org</a> (accessed 05/2015).</p>		

## Published Emergency Response Guidelines

### Emergency response planning guideline (ERPG) values

	Listed value (ppm)	Calculated value (mg/m <sup>3</sup> )
<b>ERPG-1*</b>	Data not available	
<b>ERPG-2<sup>†</sup></b>		
<b>ERPG-3<sup>‡</sup></b>		
<p>* Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined, objectionable odour</p> <p><sup>†</sup> Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action</p> <p><sup>‡</sup> Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects</p>		

### Acute exposure guideline levels (AEGLs)

	ppm				
	10 min	30 min	60 min	4 hours	8 hours
<b>AEGL-1*</b>	Data not available				
<b>AEGL-2<sup>†</sup></b>					
<b>AEGL-3<sup>‡</sup></b>					
<p>* Level of the chemical in air at or above which the general population could experience notable discomfort</p> <p><sup>†</sup> 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</p> <p><sup>‡</sup> Level of the chemical in air at or above which the general population could experience life-threatening health effects or death</p>					

## 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>	5	16	10	33
WEL – workplace exposure limit, LTEL – long-term exposure limit, STEL – short-term exposure limit <b>Reference</b> Health and Safety Executive (HSE). EH40/2005 Workplace Exposure Limits (second edition, published 2011).				

### Public health guidelines

<b>Drinking standard</b>	Data not available
<b>Air quality guideline</b>	Data not available
<b>Soil guideline values and health criteria values</b>	Data not available

## Health Effects

### Major route of exposure

- ingestion, inhalation and dermal contact

### Immediate signs or symptoms of acute exposure

Route	Signs and symptoms
<b>Inhalation</b>	Inhalation causes irritation of eyes, nose and throat. Vomiting, headache and dizziness have been reported. Inhalation may lead to systemic toxicity (see ingestion)
<b>Ingestion</b>	Ingestion may cause nausea, vomiting, abdominal pain, diarrhoea, headache, vertigo and pulmonary oedema. CNS depression may occur, also nervousness, agitation, insomnia, fatigue, peripheral neuritis and weakness and, in severe cases, coma and respiratory depression. Liver and kidney damage may also occur
<b>Dermal</b>	Dermal exposure causes irritation, photosensitisation and contact dermatitis. Prolonged contact may lead to systemic toxicity (see ingestion)
<b>Reference</b> TOXBASE. Pyridine, 03/2016. <a href="http://www.toxbase.org">http://www.toxbase.org</a> (accessed 11/2016).	



## 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.

Following disrobe, improvised dry decontamination should be considered for an incident involving pyridine **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 Public Health England (Centre for Radiation, Chemical and Environmental Hazards) 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, disrobe at the scene should be conducted by the casualty themselves and should be systematic to avoid transferring any contamination from clothing to the skin. Consideration should be given to ensuring the welfare and dignity of casualties as far as possible.

### 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.**

### Improvised dry decontamination

- any available dry absorbent material can be used such as kitchen towel, paper tissues (eg blue roll) and clean cloth
- exposed skin surfaces should be blotted and rubbed, starting with the face, head and neck and moving down and away from the body

- rubbing and blotting should not be too aggressive, or it could drive contamination further into the skin
- all waste material arising from decontamination should be left in situ, and ideally bagged, for disposal at a later stage

### Improvised wet decontamination

- water should only be used for decontamination where casualty signs and symptoms are consistent with exposure to caustic or corrosive substances such as acids or alkalis
- wet decontamination may be performed using any available source of water such as taps, showers, fixed installation hose-reels and sprinklers
- when using water, it is important to try and limit the duration of decontamination to between 45 and 90 seconds and, ideally, to use a washing aid such as cloth or sponge
- improvised decontamination should not involve overly aggressive methods to remove contamination as this could 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 etc) 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
- 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/clothes

### Interim wet decontamination

Interim decontamination is the use of standard fire and rescue service (FRS) equipment to provide a planned and structured decontamination process prior to the availability of purpose-designed decontamination equipment.

## Decontamination at the scene references

National Ambulance Resilience Unit. Joint Emergency Services Interoperability Programme (JESIP). Initial operational response to a CBRN incident. Version 1.0, September 2013.

NHS England. Emergency Preparedness, Resilience and Response (EPRR). Chemical incidents: planning for the management of self-presenting patients in healthcare settings. April 2015.

## 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 – [www.toxbase.org](http://www.toxbase.org).

### Important notes

- 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

### Clinical decontamination following surface contamination

- avoid contaminating yourself
- do NOT allow smoking nearby. There may be a risk of fire
- 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
- put soiled clothing in a sealed container to prevent escape of volatile substances
- 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) following surface contamination
- if features of systemic toxicity manage as per ingestion
- other supportive measures as indicated by the patients clinical condition

### Ocular exposure

- remove contact lenses if present
- anaesthetise the eye with a topical local anaesthetic (eg oxybuprocaine, amethocaine or similar); **however, do not delay irrigation if local anaesthetic is not immediately available**
- immediately irrigate the affected eye thoroughly with 1,000 mL 0.9% saline (eg by an infusion bag with a giving set). A Morgan Lens may be used if anaesthetic has been given. Irrigate for 10–15 minutes irrespective of initial conjunctival pH. Aim for a final conjunctival pH of 7.5–8.0. The conjunctivae may be tested with indicator paper. Retest 20 minutes after irrigation and use further irrigation if necessary

- 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 referred **urgently** to an ophthalmologist
- other supportive measures as indicated by the patient's clinical condition

## Inhalation

- maintain a clear airway and ensure adequate ventilation
- give oxygen if symptomatic
- monitor vital signs and measure blood sugar (BM)
- other supportive measures as indicated by the patient's clinical condition

## Ingestion

- maintain a clear airway and ensure adequate ventilation
- monitor vital signs and measure blood sugar (BM)
- other supportive measures as indicated by the patient's clinical condition

## Clinical decontamination and first aid references

TOXBASE	<a href="http://www.toxbase.org">http://www.toxbase.org</a> (accessed 11/2016)
TOXBASE	Pyridine, 03/2016
TOXBASE	Chemicals splashed or sprayed into the eyes, 02/2014
TOXBASE	Skin decontamination, 05/2012

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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