UK Health Security Agency

Asbestos

Incident management

Contents

Main points

General

Asbestos is non-flammable, non combustible fibre under normal conditions.

Abestos is chemically inert under normal conditions.

Asbestos is generally divided into two sub-groups; serpentine and amphiboles. They are divided into these groups based on their chemical structure.

Chrysotile asbestos fibres are soft, flexible and curved and far less hazardous than the amphibole type. Amphibole fibres (crocidolite -blue asbestos, amosite- brown asbestos, tremolite, actinolite and anthophyllite) are brittle fibres and are often rod- or needle-like in appearance. It is this form that is more hazardous to health. Crocidolite was the most commonly used amphibole asbestos in the past.

Serpentine asbestos (chrysotile or white asbestos) is the most commonly used type of asbestos, constituting around 95% of asbestos use.

Health

The most common route of exposure is by inhalation.

Acute inhalation may cause local irritation.

Skin and eye irritation may occur from fibres.

Casualty decontamination at the scene

Following exposure to asbestos, do not rub exposed areas to decontaminate as this can disturb fibres, increasing inhalation risk. It is important to avoid further dispersal of fibres into the air. Remove contaminated clothing, avoiding pulling over the head where possible, place in a bag and seal. Fibres can be removed by wet wiping with a damp cloth and gently patting exposed areas.

Environment

Inform the Environment Agency where appropriate and avoid release into the environment.

Hazard identification

Table 1. Standard (UK) dangerous goods emergency action codes for Asbestos

UN		2212	Asbestos, Amphibole (amosite, tremolite, actinolite, anthophyllite, crocidolite)	
		2590	Asbestos, Chrysotille	
EAC		2X	Use fine water spray. Wear chemical protective clothing with liquid-tight connections for whole body in combination with breathing apparatus [note 1]. Spillages, contaminated fire and decontamination run-off should be prevented from entering drains and surface and groundwaters.	
APP		–	–	
Hazards	**Class**	9	Miscellaneous dangerous substances and articles	
	Sub-risks	–	–	
HIN		90	Environmentally hazardous substance; miscellaneous dangerous substances	

Abbreviations

UN = United Nations number.
EAC = emergency action code.
APP = additional personal protection.
HIN = hazard identification number.

Note to Table 1a

[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.

Reference

‘Dangerous Goods Emergency Action Code List’. National Chemical Emergency Centre (NCEC), part of Ricardo-AEA. The Stationery Office (2023)

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

Hazard class and category	Carc. 1A	Carcinogen, category 1A	
	STOT RE 1	Specific Target Organ Toxicity (Repeated exposure), category 1	
Hazard statement	H350	May cause cancer	
	H372	Causes damage to organs through prolonged or repeated exposure	
Signal words	DANGER		

Reference

The Health and Safety Executive (HSE). 'GB CLP Regulation' (viewed January 2024)

Physicochemical properties

Table 3a. Physicochemical properties Chryosotile (serpentine)

CAS number	12001-29-5
Molecular weight	554
Formula	$Mg_3Si_2H_4O_9$ or $Mg_3(Si_2O_5)(OH)_4$
Common synonyms	White asbestos; serpentine asbestos
State at room temperature	White, grey or green fibrous solid
Volatility	Non-volatile at 20 °C
Specific gravity	2.4 - 2.6
Flammability	Non flammable
Lower explosive limit	Not available
Upper explosive limit	Not available
Water solubility	Insoluble
Reactivity	Stable under normal conditions.
Odour	Odourless

References

International Programme on Chemical Safety. ‘International chemical safety card for chrysotile’ . ICSC 0014, 2010. World Health Organization (WHO) Geneva (viewed January 2024)

PubChem [Internet]. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information; 2004-. PubChem Compound Summary for CID 25477, Chrysotile Asbestos (Viewed January 2024)

Table 3b. Physicochemical properties of amphibole asbestos

Chemical name	Crocidolite	Amosite	Anthophyllite
CAS number	12001-28-4	12172-73-5	77536-67-5
Molecular weight	766	Variable	Variable
Formula	$NaFe_3Fe_2Si_8O_{22}$ $(OH)_2$	$(Mg, Fe)_7Si_8$ $O_{22}(OH)_2$	$(Mg, Fe)_7Si_8O_{22}$ $(OH)_2$
Common synonyms	Blue asbestos; Riebeckite	Brown asbestos; Mysorite	Azbolen asbestos; Ferroanthophyllite
State at room temperature	Lavender, blue or green fibrous solid	Brown to grey-green fibrous solid	Grey, white, brown-grey, green fibrous solid
Relative density	3.3 - 3.4 (water = 1)	3.1 – 3.43 (water = 1)	2.85 - 3.1 (water=1)
Flammability	Non flammable		
Water solubiliy	Insoluble		
Reactivity	Stable under normal conditions.		
Odour	Odourless		

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2001. Toxicological profile for Asbestos. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. (viewed January 2024)

International Programme on Chemical Safety. 'International chemical safety card for crocidolite' . ICSC 1314, 2016. World Health Organization (WHO) Geneva (viewed January 2024)

PubChem [Internet]. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information; 2004-. PubChem Compound Summary for CID 86278622, Crocidolite Asbestos (viewed January 2024)

PubChem [Internet]. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information; 2004-. PubChem Compound Summary for CID 131633415 (viewed January 2024)

Table 3c. Physicochemical properties of amphibole asbestos (continued)

Chemical name	Tremolite	Actinolite
CAS number	77536-68-6	77536-66-4
Molecular weight	Variable	Variable
Formula	Ca_2Mg_5 $(Si_8O_{22})(OH)_2$	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$
Common synonyms	Fibrous tremolite	-
State at room temperature	White to pale green fibrous solid	Bright green, fibrous solid
Specific gravity	2.9 - 3.2	3.0 - 3.2
Flammability	Non flammable	
Water solubility	Insoluble	
Reactivity	Stable under normal conditions.	
Odour	Odourless	

References

PubChem [Internet]. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information; 2004-. PubChem Compound Summary for CID 131633415;(viewed January 2024)

Agency for Toxic Substances and Disease Registry (ATSDR). 2001. Toxicological profile for Asbestos. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. (viewed January 2024)

Reported effect levels from authoritative sources

Asbestos is of low acute toxicity, therefore no effect levels are reported.

Published emergency response guidelines

Table 4. Acute exposure guideline levels (AEGLs)

	Concentration				
	10 minutes	**30 minutes**	**60 minutes**	**4 hours**	**8 hours**
AEGL-1 [note 1]	Asbestos is of low acute toxicity, therefore no AEGLs are reported.				
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

The Control of Asbestos Regulations 2012
The control limit for asbestos is 0.1 asbestos fibres per cubic centimetre of air (0.1 f/cm3), averaged over a continuous period of 4 hours. The control limit is not a 'safe' level and exposure from work activities involving asbestos must be reduced to as far below the control limit as possible.

Table 5. Public health standards and guidelines

UK drinking water standard	No guideline values specified. Due to the carcinogenic nature of asbestos, exposure should be kept as low as reasonably possible (ALARP).
WHO guideline for drinking water quality	
WHO air quality guideline	

References

Health and Safety Executive. The Control of Asbestos Regulations 2012. (Viewed January 2024)

Health effects

Inhalation is the main route of exposure.

Inhalation of asbestos can cause pleural disorders, mesothelioma and lung cancer. These effects are more likely to occur following chronic exposure.

The toxicity of asbestos depends upon the fibre type. Amphibole asbestos fibres are considered to be more toxic than chrysotile asbestos fibres

Table 6. Immediate signs or symptoms of acute exposure

Route	Signs and symptoms
Inhalation	The key features of acute inhalation of dust are likely to be local irritation.
Ingestion	No acute toxicity expected after exposure by ingestion.
Dermal/ Ocular	Local irritation. Fibres may penetrate the skin and cause benign lesions.

Reference

TOXBASE. Asbestos, October 2022. (Viewed January 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 exposure to asbestos, **do not rub** exposed areas to decontaminate as this can disturb fibres, increasing inhalation risk. It is important to avoid further dispersal of fibres into the air. Remove contaminated clothing, avoiding pulling over the head where possible, place in a bag and seal. Fibres can be removed by wet wiping with a damp cloth and gently patting exposed areas.

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

Following exposure to asbestos it is important to reduce further exposure to both healthcare workers and the patient. Reduce the dispersal of dust and fibres while decontaminating the patient using the following steps below.

Clinical decontamination following surface contamination

Do not rub exposed areas as this can disturb the fibres.

Remove all visible dust and fibres from the body, clothing and footwear by wet wiping with a damp cloth using a gentle patting action.

Remove any contaminated clothing (not over the head) and place in a bag and seal.

Wash any potential sites of skin contact with copious amounts of water or soapy water.

Dermal exposure

Decontaminate (as above) the patient following surface contamination.

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

Ocular exposure

If symptomatic immediately irrigate the affected eye thoroughly.

At home:
Use lukewarm tap water, trickled into the eye or in a small cup held over the eye socket. An eye dropper is an alternative.

In hospital:

Immediately irrigate the affected eye thoroughly with 1000 mL 0.9% saline or equivalent crystalloid (for example via an infusion bag with a giving set) for a minimum of 10-15 minutes. A Morgan Lens may be used if anaesthetic has been given.

Amphoteric, hypertonic, chelating solutions may be used if available.

If symptoms persist seek medical assistance.

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

Patients should be advised on discharge to seek medical attention if symptoms subsequently develop.

Ingestion

Treatment is unlikely to be required after acute ingestion.

Inhalation

Treatment other than symptomatic management is unlikely to be required after acute exposure.

Patients who have been exposed to asbestos and who are asymptomatic after 4 hours may be discharged and do not require regular follow up. Patients should be asked to seek advice if they subsequently develop any respiratory features.

For comprehensive advice on clinical first aid, clinicians should consult TOXBASE directly.

Clinical decontamination and first aid references

TOXBASE (Viewed October 2023)
TOXBASE Asbestos (2022)
TOXBASE: Eye irritants - features and management’ (June 2023)

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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