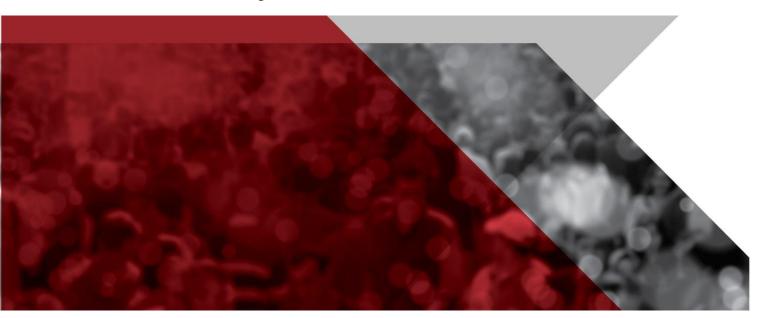


## **Health monitoring**

Guide for acrylonitrile





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## Introduction

This guide is intended to be read by a registered medical practitioner with experience in health monitoring who is engaged by person conducting a business or undertaking (PCBU) to carry out or supervise health monitoring. It provides practical guidance to registered medical practitioners about requirements under the work health and safety (WHS) laws for health monitoring.

This guide applies to all workplaces covered by the WHS Regulations where health monitoring is required.

#### How to use this guide

This guide includes references to the legal requirements under the WHS Act and WHS Regulations. These are included for convenience only and should not be relied on in place of the full text of the WHS Act or WHS Regulations.

The words 'must', 'requires' or 'mandatory' indicate a legal requirement exists that must be complied with. The word 'should' is used in this guide to indicate a recommended course of action, while 'may' is used to indicate an optional course of action.

This guide provides information for those registered medical practitioners engaged by a PCBU to carry out or supervise health monitoring for workers. This guidance should be read in conjunction with the following:

- Health monitoring guide for registered medical practitioners
- Health monitoring guides for hazardous chemicals
- Health monitoring guide for workers
- Health monitoring guide for persons conducting business or undertakings (PCBUs).

#### Health monitoring under the WHS Regulations

In certain circumstances, the model WHS Regulations place duties on a PCBU to provide health monitoring to workers. These requirements arise if the worker is carrying out work with hazardous chemicals including lead and asbestos. In addition, the work being carried out must be the kind of work specified in the WHS Regulations. A PCBU has the duty to determine if health monitoring is required.

The WHS Regulations prescribe that health monitoring is carried out by or supervised by a registered medical practitioner with experience in health monitoring.

### **Acrylonitrile**

Acrylonitrile (CAS 107-13-1) is a clear, colourless, highly flammable liquid with a mild, unpleasant odour at approximately 13 to 20 parts per million (ppm). It is also known as vinyl cyanide.

It is an organic compound consisting of a vinyl group linked to a nitrile.

#### Work activities that may represent a high risk exposure

The major uses of acrylonitrile are in the manufacture of polymers, resins, plastics and nitrile rubbers.

Examples of work activities involving acrylonitrile that require special attention when assessing exposure include:

 acrylic fibre production – especially in procedures where solvent is removed from newly-formed fibres.

Special attention should also be given to acute exposures that may occur in the above process.

#### Sources of non-occupational exposure

There are a number of potential sources of non-work-related exposure to acrylonitrile. These include:

- if acrylonitrile has previously been used as a fumigant in a domestic setting or publicly accessible area
- car exhaust
- cigarette smoke, and
- food may contain acrylonitrile as a result of migration from food containers.

Consumer exposure to acrylonitrile is estimated to be 2.2 ng/kg/day from skin contact with acrylic fibres and 33 ng/kg/day from ingestion of foods contaminated with residual acrylonitrile in packaging materials.

#### Health monitoring for acrylonitrile under the Work Health and Safety (WHS) Regulations

Collection of demographic, medical and occupational history

Records of personal exposure

Physical examination

#### Health monitoring before starting work in an acrylonitrile process

Health monitoring for acrylonitrile may be required before the worker starts work so that changes to the worker's health can be detected.

Initial discussions about a health monitoring program should include:

- possible health effects from exposure to acrylonitrile
- how to recognise and report symptoms, and
- what is involved in the health monitoring program, for example the frequency of testing and the tests that may be needed.

An initial physical examination should place emphasis on the central nervous system (CNS), respiratory system and skin if work and medical history indicates this is necessary, for example through the presence of symptoms.

Acrylonitrile is a skin sensitiser and previous work history with this chemical and symptoms of sensitisation should be investigated.

Acrylonitrile is a respiratory irritant and it is important to investigate respiratory symptoms. However, spirometry may not be required at this stage.

#### **During exposure to an acrylonitrile process**

#### 2. Monitoring exposure to acrylonitrile

Where workers are exposed, suspected of being exposed or are concerned about exposure to acrylonitrile, the person conducting the business or undertaking (PCBU) has a duty to arrange a health monitoring appointment with a registered medical practitioner. For example, an appointment should be arranged following spills or loss of containment of acrylonitrile resulting in excessive exposure to workers or when workers develop symptoms of acrylonitrile exposure.

The physical examination should focus on the CNS, respiratory system and skin.

#### Workplace exposure standard

The workplace exposure standard for acrylonitrile is:

• eight hour time weighted average (TWA) of 2 ppm (4.3 mg/m<sup>3</sup>).

A physical examination may be indicated if the results of air monitoring indicate frequent or potentially high exposure (half of the TWA or above).

**NOTE:** Acrylonitrile is readily absorbed through the skin and air monitoring results may not be a true indication of exposure.

#### Removal from work

Where the results of a medical examination indicate the worker is displaying symptoms of exposure to acrylonitrile the registered medical practitioner should consider recommending the worker be removed from acrylonitrile-related work.

When removal from acrylonitrile-related work is indicated the registered medical practitioner must provide the PCBU with the following recommendations:

- the worker should be removed from work with acrylonitrile, and
- the PCBU should review control measures and carry out recommended remedial action.

The worker must be informed of the results of the health monitoring.

#### Return to work

Should a worker be removed from acrylonitrile-related work, they must not return until the registered medical practitioner has:

- assessed them as medically fit, and
- made a recommendation to the PCBU that the worker can return to remediated acrylonitrile-related work.

This assessment should take into consideration the clinical condition of the worker and remediation of the circumstances that led to the symptoms if possible.

#### At termination of work in an acrylonitrile process

#### 3. Final medical examination

A final medical examination should be carried out with emphasis on the CNS, respiratory system and skin. Other target areas should be examined as per the patient's health monitoring results, for example any other acrylonitrile exposure related symptoms.

Workers with health conditions or continuing symptoms due to acrylonitrile exposure should be advised to seek continuing medical examinations as organised by the registered medical practitioner supervising the health monitoring program.

A health monitoring report from the registered medical practitioner should be provided to the PCBU as soon as practicable after the completion of the monitoring program, and at regular intervals for longer term or ongoing health monitoring processes. The report must include:

- the name and date of birth of the worker
- the name and registration number of the registered medical practitioner
- the name and address of the person conducting the business or undertaking who commissioned the health monitoring
- the date of the health monitoring
- any test results that indicate whether or not the worker has been exposed to a hazardous chemical
- any advice that test results indicate that the worker may have contracted an injury, illness or disease as a result of carrying out the work that triggered the requirement for health monitoring
- any recommendation that the person conducting the business or undertaking take remedial measures, including whether the worker can continue to carry out the type of work that triggered the requirement for health monitoring, and
- whether medical counselling is required for the worker in relation to the work that triggered the requirement for health monitoring.

#### Potential health effects following exposure to acrylonitrile

#### 4. Route of occupational exposure

The primary route of acrylonitrile exposure is via inhalation, with an average respiratory retention of 52 per cent. Acrylonitrile can also be absorbed through the skin in quantities sufficient to cause adverse health effects.

#### 5. Target organ/effect

The target organs and potential effects of acrylonitrile exposure include:

 Table 1 Target organs and potential effects of acrylonitrile exposure

Target organ	Effect	
Central nervous system	<ul><li>Headache</li><li>Dizziness</li><li>General weakness</li></ul>	

Respiratory tract

Irritation

Target organ	Effect
Skin	<ul><li>Irritation</li><li>Burns</li><li>Blisters</li><li>Sensitisation</li></ul>
Eyes	• Irritation

Acrylonitrile is rapidly and extensively absorbed by all exposure routes.

#### 6. Acute effects

Acrylonitrile is a cellular asphyxiant with actions similar to cyanide. Acute exposure and poisoning may cause symptoms including:

- rapid onset of eye, nose, throat and airway irritation
- sneezing
- profound weakness
- headache and light headedness
- nausea and vomiting
- shortness of breath
- dizziness
- collapse
- convulsions
- asphyxia, or
- death.

High exposures to acrylonitrile may result in temporary damage to red blood cells (anaemia), and the liver (palpable liver, increased metabolic activity). Effects dissipate when exposure ceases.

Prolonged skin contact with liquid acrylonitrile may result in dermal absorption with systemic effects (such as those outlined above) and the formation of large blisters at the contact site after a latency period of several hours.

#### 7. Chronic effects

Chronic exposure at lower concentrations via inhalation may cause:

- headache
- insomnia
- irritability
- nose bleeds
- · respiratory difficulties, or
- abnormal liver function.

Repeated spills on exposed skin may result in contact dermatitis or skin sensitisation.

#### 8. Carcinogenicity

Acrylonitrile has been classified as a Category 1B carcinogen according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as it is presumed to cause cancer in humans.

Some studies of workers potentially exposed to acrylonitrile have demonstrated an increased incidence of cancer of the lung, gastrointestinal tract and prostate.

Under the model Work Health and Safety Regulations, acrylonitrile is listed as a restricted carcinogen and must not be used at concentrations greater than 0.1 per cent without authorisation from a relevant work health and safety regulator.

#### 9. GHS classification

The following GHS health hazard classification for acrylonitrile has been taken from Safe Work Australia's Hazardous Chemicals Information System:

#### **Hazard category**

Carcinogenicity - category 1B

Acute toxicity - category 3 (toxic if inhaled)

Acute toxicity - category 3 (toxic in contact with skin)

Acute toxicity – category 3 (toxic if swallowed)

Specific target organ toxicity (single exposure) - category 3

(may cause respiratory irritation)

Skin irritation – category 2

Eye damage - category 1

Skin sensitisation - category 1

#### Source documents

Agency for Toxic Substances and Disease Registry, <u>Medical Management Guidelines for Acrylonitrile</u>.

Agency for Toxic Substances and Disease Registry (1990); <u>Toxicological Profile for Acrylonitrile</u>; US Public Health Service (PDF 2.49MB).

Australian Chemical Industry Council (1992) Code of Practice on the Safe Handling of Acrylonitrile, Australian Chemical Industry Council, Melbourne.

<u>Chemical analysis branch handbook, 9th Edition, Workplace and biological monitoring exposure analysis, WorkCover NSW (PDF 3.39MB).</u>

International Programme on Chemical Safety (1983) *Environmental Health Criteria 28: Acrylonitrile*, International Programme on Chemical Safety, World Health Organization, Geneva.

Lauwerys, R.R. and Hoet, P. (2001) *Industrial Chemical Exposure Guidelines for Biological Monitoring*, 3rd Ed, Lewis Publishers, Boca Raton.

National Industrial Chemicals Notification and Assessment Scheme, *Acrylonitrile, Priority Existing Chemical Assessment Report No. 10*, Feb 2000.

National Toxicology Program (2011) *Acrylonitrile*, in 12th Report on Carcinogens, United States Department of Health and Human Services, Public Health Service.

Safe Work Australia (2013); <u>Workplace Exposure Standards for Airborne Contaminants</u> (PDF 873KB).

Safe Work Australia; Hazardous Chemicals Information System.

World Health Organisation/International Program on Chemical Safety (2002) Concise International Chemical Assessment Document 39: Acrylonitrile, WHO, Geneva.



# **Health monitoring report**

Acrylonitrile

(information provided by the PCBU)

☐ New to acrylonitrile work

This form contains confidential information and must not be disclosed to another person except in accordance with the Work Health and Safety Regulations or with consent of the worker

### Health monitoring report - Acrylonitrile

This health monitoring report is a confidential health record and must not be disclosed to another person except in accordance with the Work Health and Safety Regulations or with the consent of the worker.

There are two sections. Complete both sections and all questions as applicable.

**Section 1** A copy of this section should be forwarded to the person conducting the business or undertaking (PCBU) who has engaged your services.

**Section 2** may contain confidential health information. Information that is required to be given to the PCBU should be summarised in Section 1.

#### Section 1 – A copy of this section to be provided to the PCBU

#### Person conducting a business or undertaking Company/organisation name: Click here to enter text. Site address: Click here to enter text. Suburb: Click here to enter text. Postcode: Click here to enter text. Site Tel: Click here to enter text. Site Fax: Click here to enter text. Contact Name: Click here to enter text. Other businesses or undertakings engaging the worker □ N/A (include a separate section for each PCBU) Company/organisation name: Click here to enter text. Site address: Click here to enter text. Suburb: Click here to enter text. Postcode: Click here to enter text. Site Tel: Click here to enter text. Site Fax: Click here to enter text. Contact Name: Click here to enter text. Worker details (tick all relevant boxes) Surname: Click here to enter text. Given names: Click here to enter text. Date of birth: Click here to enter a date. **Sex:** □ Male □ Female Address: Click here to enter text. Suburb: Click here to enter text. Postcode: Click here to enter text. Current job: Click here to enter text. **Tel (H):** Click here to enter text. Mob: Click here to enter text. Date started employment: Click here to enter a date. **Employment in acrylonitrile risk work** (tick all relevant boxes)

☐ New worker but not new to acrylonitrile work					
☐ Current worker continuing in acrylonitrile work					
Worked with acrylonitrile since: Click here to enter a date.					
Risk assessment completed: $\square$ Yes $\square$ No					
Work environment assessment (tick all relevent (information provided by the PCBU)	vant boxes)				
Date of assessment: Click here to enter a date.  Acrylonitrile industry/use					
☐ Acrylic fibre production – especially where solve	nt is removed from nev	vly-formed fil	bres		
☐ Used as a fumigant	☐ Other (specify): Clic	ck here to en	ter text.		
Other chemicals the worker may be exposed to	o: Click here to enter to	ext.			
Controls					
Wear gloves		☐ Yes	□ No		
Respirator use		☐ Yes	□ No		
Respirator type		Click here	to enter text.		
Local exhaust ventilation		□ Yes	□ No		
Overalls/work clothing		□ Yes	□ No		
Laundering by employer		□ Yes	□ No		
Wash basins and showers (with hot and cold water	er)	□ Yes	□ No		
Other please specify					
Health monitoring results					
Comments about health monitoring results (fo of injury, illness or disease): Click here to ente		ndications c	or diagnosis		
Recommendations (by registered medical pra	actitioner) (tick all rele	evant boxes	s)		
Further/additional health monitoring for worker	, ,		,		
☐ This is the final health monitoring report					
☐ Repeat health assessment in Click here to enter text. month(s) / Click here to enter text. week(s)					
☐ Counselling required					
☐ Medical examination by registered medical prac	titioner. On Click here t	o enter a da	te.		
☐ Referred to Medical Specialist (respiratory/derm	atology/other). On Clicl	k here to ent	er a date.		
Recommendations to the PCBU					
$\square$ The worker is suitable for work with acrylonitrile					
☐ Review workplace controls					

$\Box$ The worker should be removed from work with acrylonitrile. On Click here to enter a date.												
☐ The worker is fit to resume work. On Click here to enter a date. ☐ Biological monitoring results indicate unacceptably high exposure levels  Specialist's name: Click here to enter text.												
							Additional comments or recommendations: Click here to enter text.					
							Registered medical practitioner (responsib	le for supervising health monitoring)				
Name: Click here to enter text.												
Signature:												
Date: Click here to enter a date.												
Tel: Click here to enter text.	Fax: Click here to enter text.											
Registration Number: Click here to enter text.												
Medical Practice: Click here to enter text.												
Address: Click here to enter text.												
Suburb: Click here to enter text.	Postcode: Click here to enter text.											

## Section 2 – This section to be retained by the registered medical practitioner

Person conducting a business or undertaking					
Company/organisation name: Click here Site address: Click here to enter text. Suburb: Click here to enter text. Site Tel: Click here to enter text. Contact Name: Click here to enter text.	Postc	ode: Click here to enter text.  ax: Click here to enter text.			
Other businesses or undertakings	engaging the	worker			
Company/organisation name: Click here to enter text.  Site address: Click here to enter text.  Suburb: Click here to enter text.  Postcode: Click here to enter text.  Site Tel: Click here to enter text.  Site Fax: Click here to enter text.  Contact Name: Click here to enter text.					
Worker details (tick all relevant boxes	s)				
Surname: Click here to enter text.  Date of birth: Click here to enter a date.  Sex:  Male  Pregnant/breastfeeding  Address: Click here to enter text.  Suburb: Click here to enter text.  Postcode: Click here to enter text.  Current job: Click here to enter text.  Tel (H): Click here to enter text.  Mob: Click here to enter text.  Date started employment: Click here to enter a date.  Past employment and exposure details (tick all relevant boxes)					
Have you ever worked in any of the following of the question as cough or wheeze or asthma when work the following of the question in the following of the following of the following in the following of the follo	ons, please advi	comments (all 'yes' answers)  Click here to enter text.			
especially where solvent is removed from newly-formed fibres					
Other (please specify)	o □ Yes	Click here to enter text.			

#### In any of your past workplaces were you were exposed to:

			Comments (all 'yes' answers)	
Acrylonitrile	□ No	□ Yes	Click here to enter text.	
Benzene	□ No	☐ Yes	Click here to enter text.	
Degreasers	□ No	☐ Yes	Click here to enter text.	
Formaldehyde	□ No	☐ Yes	Click here to enter text.	
Paint remover	□ No	☐ Yes	Click here to enter text.	
Solvents	□ No	☐ Yes	Click here to enter text.	
Cleaning fluids	□ No	☐ Yes	Click here to enter text.	
Isocyanates	□ No	☐ Yes	Click here to enter text.	
Metals fumes or dusts	□ No	□ Yes	Click here to enter text.	
Gas	□ No	□ Yes	Click here to enter text.	
Adhesives	□ No	□ Yes	Click here to enter text.	
Rubber	□ No	□ Yes	Click here to enter text.	
Cement	□ No	□ Yes	Click here to enter text.	
Roofing materials	□ No	□ Yes	Click here to enter text.	
Lacquer	□ No	□ Yes	Click here to enter text.	
Plastics	□ No	□ Yes	Click here to enter text.	
Resins	□ No	□ Yes	Click here to enter text.	
Paint	□ No	□ Yes	Click here to enter text.	
Pesticides	□ No	□ Yes	Click here to enter text.	
General health questionnaire (tick all relevant boxes)				
			Comments (all 'yes' answers)	
Did you suffer any incapacity lasting two weeks or longer in the last two years	□ No	□ Yes	Click here to enter text.	
Have you ever had any operations or accidents or been hospitalised for any reason	□ No	□ Yes	Click here to enter text.	
Are you currently being treated by a doctor or other health professional for any illness or injury	□ No	□ Yes	Click here to enter text.	
Are you currently receiving any medical treatment or taking any medications. Please detail.	□ No	☐ Yes	Click here to enter text.	

			Comments (all 'yes' answers)
Do you practice personal hygiene at work, for example nail biting, frequency of hand washing, eating or smoking, clean shaven, shower and change into clean clothes at end of shift	□ No	□ Yes	
Specific health questions (tick a	all relevar	nt boxes)	
Do you have or have you ever ha	d:		Comments (all 'yes' answers)
Blurred vision or other vision problems	□ No	□ Yes	Click here to enter text.
Itchy eyes, runny and/or congested nose	□ No	☐ Yes	Click here to enter text.
Shortness of breath on exertion	□ No	☐ Yes	Click here to enter text.
Wheezing, bronchitis or asthma now or in the past	□ No	□ Yes	Click here to enter text.
Any other lung or respiratory conditions (emphysema, pneumonia or sinusitis)	□ No	□ Yes	Click here to enter text.
Allergies, hay fever, or allergic bronchitis	□ No	☐ Yes	Click here to enter text.
Breathing problems, nasal blockage, nose bleeds or lump in nose	□ No	□ Yes	Click here to enter text.
Other respiratory irritation	□ No	□ Yes	Click here to enter text.
Liver disease (including alcohol related or other hepatitis)	□ No	☐ Yes	Click here to enter text.
Severe headaches or migraines	□ No	□ Yes	Click here to enter text.
Any neurological condition affecting nerves in your feet or hands, your coordination or balance	□ No	□ Yes	Click here to enter text.
Heavy use or substance abuse of drugs and/or alcohol	□ No	☐ Yes	Click here to enter text.
Skin disorders or dermatitis	□ No	□ Yes	Click here to enter text.
Any form of cancer	□ No	□ Yes	Click here to enter text.
Any other significant health conditions	□ No	☐ Yes	Click here to enter text.
Symptoms of	Further	testing	Comments
CNS dysfunction including headaches or dizziness	□ No	□ Yes	Click here to enter text.
Respiratory irritation or disorder	□ No	☐ Yes	Click here to enter text.
Skin irritation or disorder	□ No	□ Yes	Click here to enter text.

Do you have or have you ever had:			Comments (all 'yes' answers)	
Irritation of eyes, nose or throat	□ No	□ Yes	Click here to enter text.	
Others:	□ No	☐ Yes	Click here to enter text.	
General health assessment (if	applicable	<del>)</del> )		
Height: Click here to enter text. cm Weig			ht: Click here to enter text. kg	
BP: Click here to enter text. / Click	here to ente	er text. mm	nHg	
Urinalysis				
Blood: ☐ Normal ☐ Abnormal				
Protein: Click here to enter text.		Refer	red for further testing	
Sugar: Click here to enter text.		□ No	□ Yes	
Respiratory system			Medical comments (for all abnormal)	
Breathing normal and regular in character	□ Yes	□ No	Click here to enter text.	
Auscultation normal	☐ Yes	□ No	Click here to enter text.	
Signs of past/present respiratory disease	□ No	□ Yes	Click here to enter text.	
Skin				
Eczema, dermatitis or allergy	□ No	☐ Yes	Click here to enter text.	
Skin cancer or other abnormality	□ No	□ Yes	Click here to enter text.	
Evidence of nail biting	□ No	□ Yes	Click here to enter text.	
Other	□ No	□ Yes	Click here to enter text.	

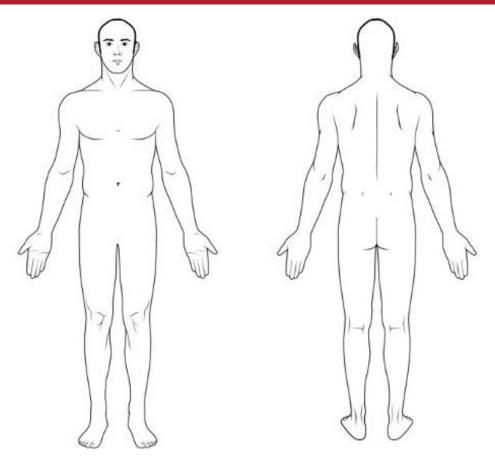


Figure 1 Template of the human body to indicate the location of abnormalities

Other medical history, family medical history, current medication, comments, tests or recommendations (use separate sheet if necessary)

Click here to enter text.

Registered medical practitioner (responsible for supervising health monitoring)

Name: Click here to enter text.

Signature:

Date: Click here to enter a date.

Tel: Click here to enter text. Fax: Click here to enter text.

Registration Number: Click here to enter text.

Medical Practice: Click here to enter text.

Address: Click here to enter text.

Suburb: Click here to enter text. Postcode: Click here to enter text.