Acrylonitrile

General Information

Key Points

- colourless, volatile, flammable liquid, with a faintly pungent odour
- not naturally occurring, manufactured using industrial processes
- used in the manufacture of acrylic and modacrylic fibres for use in clothing and textiles
- used in the production of plastics and resins
- inhalation can cause nausea, dizziness and vomiting, tremors and convulsions
- skin contact can cause severe irritation, redness, blistering and peeling of skin
- the International Agency for Research on Cancer classify acrylonitrile as possibly causing cancer in humans
Public Health Questions

What is acrylonitrile?
Acrylonitrile is a colourless, volatile, flammable liquid, with a faintly pungent odour. It is not naturally occurring. It is also known as vinyl cyanide and cyanoethylene.

What is acrylonitrile used for?
Acrylonitrile is used in the manufacture of acrylic and modacrylic fibres for use in clothing and textiles such as fleece jumpers, sportswear, carpets and upholstery. Acrylic fibres are also used as a precursor in the production of carbon fibre. It is used in the production of plastics and resins such as ABS (acrylonitrile-butadiene-styrene), SAN (styrene-acrylonitrile) and nitrile rubber for fuel hoses and O-ring seals. Acrylonitrile is also used as a chemical intermediate in the production of other chemicals such as acrylamide and adiponitrile.

Acrylonitrile has historically been used in combination with carbon tetrachloride as a pesticide fumigant for flour milling and bakery equipment and for storing tobacco. This use of acrylonitrile has since been discontinued because it can cause adverse health effects.

How does acrylonitrile get into the environment?
Acrylonitrile does not occur naturally in the environment, and as such is most likely to enter the environment from workplaces where it is manufactured or used. Smoking cigarettes and tobacco will also release small quantities of acrylonitrile into the environment.

How might I be exposed to acrylonitrile?
Exposure to acrylonitrile is most likely to occur through occupational exposure. Residual amounts of acrylonitrile may, however, be present in products which are manufactured with acrylonitrile, such as acrylic fibres, plastics and resins but these levels are unlikely to have adverse effects on health. Cigarette and tobacco smoke are also potential sources of exposure to acrylonitrile.

If I am exposed to acrylonitrile how might it affect my health?
The presence of acrylonitrile in the environment does not always lead to exposure. In order for acrylonitrile to cause any adverse health effects, you must come into contact with it. You may be exposed by breathing, eating, or drinking the substance or by skin contact. Following exposure to any chemical, the adverse health effects you may encounter depend on several factors, including the amount to which you are exposed (dose), the way you are exposed, the duration of exposure, the form of the chemical and if you are exposed to any other chemicals.

Breathing air contaminated with acrylonitrile vapour or swallowing solutions containing acrylonitrile can give rise to nausea, dizziness and vomiting. More severe exposures to acrylonitrile by inhalation or ingestion can cause tremors, discoloration of the skin, fitting,
collapse and in some cases can result in death. Skin contact with acrylonitrile, can cause severe irritation, with redness, blistering and peeling of the skin, which heals very slowly.

Long term exposure can cause effects such as headache, chest pains, insomnia, fatigue, and increased irritability. Repeated or prolonged skin contact with acrylonitrile can give rise to an allergic skin reaction in some individuals, with symptoms such as redness, itching, rash and swelling of the skin.

Can acrylonitrile cause cancer?
The International Agency for Research on Cancer (IARC) has concluded that there is enough evidence in experimental animals, but not in humans that acrylonitrile can cause cancer. Therefore, it has classified acrylonitrile as possibly having the ability to cause cancer in humans.

Does acrylonitrile affect pregnancy or the unborn child?
There are limited data available on the direct effects of exposure to acrylonitrile during pregnancy. Therefore, it is not possible to draw any definitive conclusions. Effects on the unborn child are more likely to occur if the exposure to acrylonitrile causes the mother to become unwell.

How might acrylonitrile affect children?
Children exposed to acrylonitrile will display similar effects to those seen in exposed adults, although the effects may be more severe.

Are certain groups more vulnerable to the harmful effects of acrylonitrile?
People with breathing problems such as asthma may be more sensitive to the effects of acrylonitrile.

What should I do if I am exposed to acrylonitrile?
It is very unlikely that the general population will be exposed to a level of acrylonitrile high enough to cause adverse health effects. However, if you have any health concerns regarding exposure to acetonitrile seek guidance from your GP or contact NHS 111.

Additional sources of information
UKTIS. Best Use of Medicines in Pregnancy http://www.medicinesinpregnancy.org/