



Arsine and Stibine

General Information

Key Points

- arsine and stibine are both colourless gases with distinctive odours
- they are extensively used in the semiconductor industry
- exposure to both arsine and stibine are mainly through industrial processes
- the health effects of arsine and stibine are similar and are characterised by damage to the red blood cells (haemolysis)
- there is no available data to suggest that arsine or stibine themselves cause cancer although the chemicals arsine is broken down into are known to cause cancer

Public Health Questions

What are arsine and stibine?

Arsine is a colourless, non-irritating, flammable, toxic gas that has a mild garlic odour. Other names for arsine include arsenic hydride, arsenic trihydride, arseniuretted hydrogen, arsenious hydride, hydrogen arsenide and Agent SA.

Stibine is a colourless gas with a disagreeable odour that resembles rotten eggs. Other names for stibine include antimony hydride or antimony trihydride.

What are arsine and stibine used for?

Arsine and stibine are extensively used in the semiconductor industry as doping agents. Arsine is also used as an agent in the manufacture of light-emitting diodes and glass dyes and in the production of microchips.

How do arsine and stibine get into the environment?

Small amounts of arsine may be produced and released into the environment from natural processes involving bacteria and fungi.

Industrial processes, including welding, soldering, refining, galvanising and etching may lead to the accidental formation of arsine or stibine. Overcharging of lead storage batteries can also lead to the production of arsine and stibine.

How might I be exposed to arsine or stibine?

The general population is not likely to be exposed to arsine and stibine. Exposure is more likely to occur in the workplace where arsine and stibine may be used or accidentally formed. However, safe limits are enforced to protect the employees; such levels are below those that are thought to cause harmful effects.

If I am exposed to arsine or stibine how might they affect my health?

The presence of arsine and stibine in the environment does not always lead to exposure. In order for them to cause any adverse health effects, you must come into contact with them. You may be exposed by breathing in the substances or by skin contact. Following exposure to any chemical, the adverse health effects that 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 were exposed to any other chemicals.

Symptoms of poisoning may be delayed for several hours. Inhalation may cause headaches, thirst, dizziness and breathlessness, followed by feeling and being sick and stomach-ache. Red urine may develop after 4-6 hours and skin and eyes may discolour to orange. There may be numbness and pain in the extremities.

After 1-2 days, fever, anaemia, jaundice, enlargement of the liver and pulmonary oedema may occur. Liver and kidney failure may occur.

Can arsine or stibine cause cancer?

There are no data available to assess the carcinogenicity of arsine or stibine.

Arsine is broken down in the body to a number of compounds some of which are recognized by the International Agency for Research on Cancer (IARC) as known human carcinogens. Prolonged exposure may therefore result in an increase in risk of cancer.

Does arsine or stibine affect pregnancy or the unborn child?

There are limited data available on the direct effects of exposure to arsine or stibine 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 arsine or stibine causes the mother to become unwell.

How might arsine or stibine affect children?

Children will be affected by arsine and stibine in the same way as adults.

What should I do if I am exposed to arsine or stibine?

It is very unlikely that the general population will be exposed to a level of arsine or stibine high enough to cause adverse health effects. Arsine and stibine are not used in the home; therefore exposure in the home is unlikely. 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 (bumps): <http://www.medicinesinpregnancy.org/>

NHS Choices – Poisoning: <http://www.nhs.uk/Conditions/Poisoning/Pages/Introduction.aspx>

This information contained in this document from the PHE Centre for Radiation, Chemical and Environmental Hazards is correct at the time of its publication.

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