

Asbestos

General information

Key Points

Fire

- Non flammable and non combustible under normal conditions
- Chemically inert under normal conditions. Resistant to most solvents, acids and alkalis
- In the event of a fire involving asbestos, use fine water spray and liquid-tight protective clothing with breathing apparatus

Health

- The most common route of exposure is by inhalation
- Toxic and carcinogenic
- In general asbestos is not considered to be acutely toxic
- Short-term high level exposure may cause pleural disorders, mesothelioma or lung cancer after a long latency period
- Long-term low level inhalation exposure may cause pleural disorders, mesothelioma or lung cancer; long-term high dose exposure may cause asbestosis
- Asbestos is a category 1 carcinogen i.e. is carcinogenic to humans
- Asbestos has not been linked with any adverse reproductive outcomes in humans

Environment

- Environmentally hazardous substance
- Inform Environment Agency of substantial release incidents

Background

Asbestos is a general name given to several naturally occurring fibrous minerals that have crystallised to form long thin fibres. They are divided into two sub-groups: serpentine (chrysotile (white asbestos)), which is the most commonly used type of asbestos and amphiboles, which includes crocidolite (blue asbestos), amosite (brown asbestos), tremolite, actinolite and anthophyllite, of which crocidolite was the most commonly used in the past.

Asbestos minerals are widespread in the environment. They may be found in the soil due to erosion of asbestos-bearing rock.

Asbestos fibres are strong, heat and chemical resistant and they do not evaporate into the air or dissolve in water. Such properties made it an ideal material for use in a number of products, including insulation material for buildings, boilers and pipes; insulating board to protect buildings and ships against fire; asbestos cement for roofing sheets and pipes. Due to the risk to health following exposure to asbestos, importation, supply and use of all asbestos products have been banned in the UK since 1999. People however, may still be exposed to existing asbestos-containing materials in buildings etc due to the widespread use in the past.



Most asbestos products pose little risk if they are intact. However, if asbestos-containing products are damaged in some way, fibres may be released into the air and may be breathed in.

Asbestos in air may arise from natural weathering of asbestos-containing ores or damage and breakdown of asbestos-containing products. People may also be exposed to asbestos in drinking water. Although asbestos does not dissolve, fibres may enter water after being eroded from natural sources, from asbestos-cement or from asbestos-containing filters

People who work with asbestos or with asbestos-containing products such as miners or those producing asbestos-containing products are likely to be exposed to much higher levels of asbestos fibres in air than the general public. In addition, as asbestos has been widely used in building for fire-proofing, insulation or floor and ceiling tiles, those involved in demolition work, asbestos abatement, building repair and maintenance may be exposed to higher levels as disturbing such materials releases fibres into the air.



Breathing in high concentrations of asbestos for a long period of time mainly affects the lungs, causing a disease called asbestosis where breathing becomes difficult and the heart enlarges. People breathing in lower concentrations may get pleural plaques, mesothelioma or lung cancer.

The health effects of swallowing asbestos in water or food are unclear.

The International Agency for Research on Cancer (IARC) has classified asbestos as being carcinogenic to humans.

Production and Uses

Key Points

- Asbestos fibres do not dissolve in water or evaporate, they are resistant to heat, fire, chemical and biological degradation and are mechanically strong
- Due to their physical properties they are used in many products, including insulation for houses, ceiling and floor tiles and car brakes, as well as many others

Asbestos is a general name given to several naturally occurring fibrous silicate minerals. Such silicate minerals are characterised by fine, long parallel fibres or bundles. Overall, asbestos fibres do not dissolve in water or evaporate, they are resistant to heat, fire, chemical and biological degradation and are mechanically strong. Such properties make it an ideal material for use in a number of products, including insulation material for buildings, boilers and pipes, sprayed coating/lagging, insulating boards, asbestos cement, ropes, cloth, car brakes and clutches, ceiling and floor tiles, coated metal, textured paints and reinforced plastic amongst others.

Serpentine asbestos: Chrysotile is the most common and abundant form of asbestos. It is a magnesium silicate mineral, often referred to as white asbestos. Chrysotile fibres are soft, flexible and curved that may be separated easily into small bundles and individual fibrils. Chrysotile fibres naturally occur in lengths $< 5 \mu\text{m}$. Due to their structure they may be woven and can withstand mechanical treatment better than the amphibole fibres.

Amphibole asbestos: This group includes crocidolite, amosite, anthophyllite, tremolite and actinolite (figure 1). Amphibole asbestos fibres include silicates of magnesium, iron, calcium and sodium. Fibres are brittle and have a rod- or needle shaped appearance. They are more heat and chemical resistant than serpentine fibres.

Crocidolite is a sodium iron silicate, commonly known as blue asbestos. Crocidolite fibre bundles can disperse into smaller fibres ($5 - 10 \mu\text{m}$), although such fibres are generally not as small as those of chrysotile. Fibres of crocidolite are relatively flexible, have a poor resistance to heat, but are highly resistant to acid.

Amosite is made up of iron magnesium silicate, often referred to as brown asbestos. The fibres are usually yellow-grey to dark brown and are very coarse. Amosite fibres are approximately $5 - 10 \mu\text{m}$.

Anthophyllite is another fibrous form of iron magnesium silicate. Fibres are grey or brown grey and have similar properties to amosite but have no commercial value. In general, anthophyllite fibres are approximately $5 - 10 \mu\text{m}$.

Tremolite is a grey-white, yellow, green or blue calcium magnesium silicate. It is found as a contaminant with other fibres such as chrysotile and has no industrial applications. Tremolite fibres range in size ($5 - 10 \mu\text{m}$).

Actinolite asbestos occurs as a contaminant of both chrysotile and talc deposits.

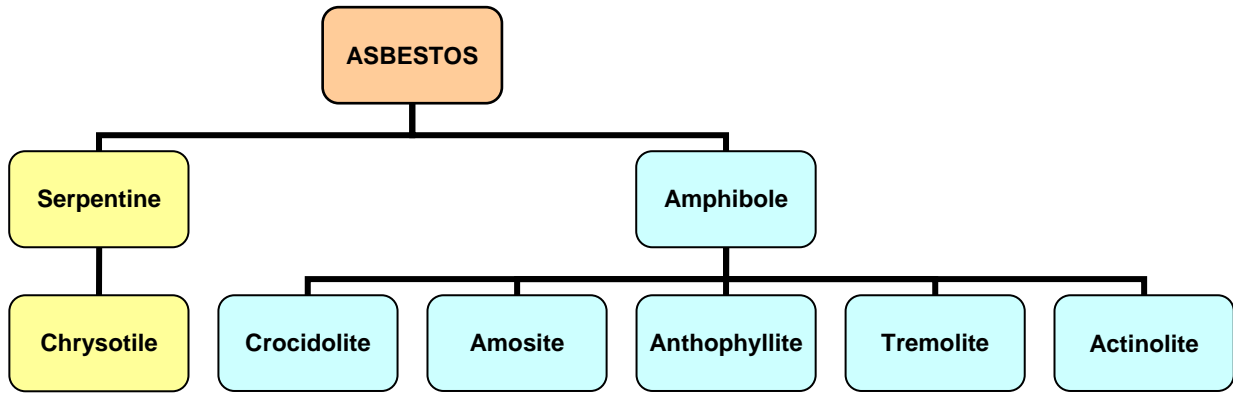


Figure 1. Types of serpentine and amphibole asbestos fibres

Frequently Asked Questions

What is asbestos?

Asbestos is a general name given to several naturally occurring fibrous minerals that have crystallised to form long thin fibres. They are divided into two sub-groups: serpentine (chrysotile (white asbestos)), which was the most commonly used type of asbestos and amphiboles, which includes crocidolite (blue asbestos), amosite (brown asbestos), tremolite, actinolite and anthophyllite, of which crocidolite was the most commonly used. Blue and brown asbestos are considered to be the most dangerous. The importation, supply and use of blue and brown asbestos have been banned in the UK since 1985 and this ban was extended to include white asbestos in 1999.

Chrysotile asbestos fibres are soft, flexible and curved whereas amphibole asbestos fibres are brittle and often are rod- or needle-like in appearance.

Asbestos fibres do not dissolve in water or evaporate, they are resistant to heat, fire, chemical and biological degradation and are mechanically strong, hence it has been used in a wide number of products such as car brakes and insulation.

How does asbestos get into the environment?

Asbestos fibres may enter the atmosphere due to the erosion of natural asbestos-containing ores or damage to asbestos-containing products including insulation, car brakes and clutches, ceiling and floor tiles and cement.

How will I be exposed to asbestos?

Asbestos minerals are widespread in the environment due to naturally occurring sources or from the damage of products containing asbestos. The asbestos fibres from damaged asbestos-containing products can break down into smaller fibres. People are most likely to be exposed to asbestos by breathing in fibres that are suspended in air, or may swallow small amounts of the fibres if the asbestos enters the soil or water.

Indoor air may contain small levels of asbestos from insulation, ceiling or floor tiles, or other purposes. Levels depend on the state of the products, as more fibres will be released from materials that are damaged.

People who worked with asbestos or with asbestos-containing products were likely to be exposed to much higher levels of asbestos fibres in air than the general public. However, as the use of new asbestos products is now banned only those involved in demolition work, asbestos abatement, building repair and maintenance may be exposed to higher levels as disturbing such materials releases fibres into the air.

If there is asbestos in the environment will I have any adverse health effects?

The presence of asbestos in the environment does not always lead to exposure as you must come into contact with the chemical. You may be exposed by breathing, eating, or drinking the substance or by skin contact. Following exposure to any hazardous chemical, the adverse health effects you may encounter depend on several factors, including the amount to which you are exposed (dose), the duration of exposure, the way you are exposed, the form of asbestos and if you were exposed to any other chemicals.

All forms of asbestos are hazardous as they induce cancer, but amphibole forms of asbestos are considered to be somewhat more hazardous to health than chrysotile.

Breathing in high concentrations of asbestos for a long period of time mainly affects the lungs, causing a disease called asbestosis where breathing becomes difficult and the heart enlarges. People breathing in lower concentrations for a long period of time may get pleural plaques, mesothelioma or lung cancer.

Can asbestos cause cancer?

The International Agency for Research on Cancer (IARC) has classified asbestos as being carcinogenic to humans.

Does asbestos affect children or damage the unborn child?

Several experimental studies have suggested that asbestos does not cause adverse pregnancy outcomes or birth defects.

If children are exposed to asbestos by inhalation they may develop lung cancer or mesothelioma after a prolonged latent period. However, this may occur at a younger age than when exposure occurs in adults.

What should I do if I am exposed to asbestos?

It is very unlikely that the general population will be exposed to a level of asbestos high enough to cause adverse health effects.

This document from the HPA Centre for Radiation, Chemical and Environmental Hazards reflects understanding and evaluation of the current scientific evidence as presented and referenced in this document.