

# Asbestos types, history, and global use

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## **Asbestos types, history, and global use**

this talk is available online

<http://carlreynolds.net/asbestos-types-history-and-global-use>

### **Learning outcomes**

1. give examples of important commercial asbestos fibre types
2. describe the physical properties of asbestos
3. outline historic and contemporary asbestos use

## **Asbestos**

### **Why does asbestos matter?**

#### **Asbestos matters because**

- its a carcinogen
- its a cause of death and disability
- its an on-going occupational problem

## So what is asbestos?

The word ‘asbestos’ came into English usage in the early 17th century, via Latin from the Greek asbestos meaning ‘unquenchable’ or ‘unextinguishable’.

This is apt because one of the commercially useful properties asbestos has been exploited for is its incombustibility.

(as an aside, there’s more to it)

**Asbestos** refers to a set of six (Chrysotile, Crocidolite, Amosite, Anthophyllite, Actinolite, Tremolite) **silicate minerals** characterised by being **asbestiform**

- A **silicate** is a salt or ester of silicic acid. Most commonly this is a silica oxide anion which combines with a cation.
- A **mineral** is a naturally occurring chemical compound. Silicate minerals make up over 90% of the earth’s crust.
- **Asbestiform** refers to the form of a mineral in which ultra-fine single crystal fibers (fibrils) occur in bundles that can be separated into increasingly finer fiber bundles.

## Where does asbestos come from?

- Asbestos minerals are widespread in the environment, and are found in many areas where the original rock mass has undergone metamorphism.
  - Metamorphism is the alteration of the composition or structure of a rock by heat, pressure, or other natural agency.
  - Chrysotile is the most commonly occurring form of asbestos.
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- The largest asbestos pit in the world is in Russia’s Ural Mountains on the outskirts of the town Asbest (named for its asbestos industry).

## What are the types of asbestos?

Commercial Name	Mineral Group	Chemical Formula
Chrysotile	Serpentine	$(\text{Mg, Fe})_6(\text{OH})_8\text{Si}_4\text{O}_{10}$
Crocidolite	Amphibole	$\text{Na}_2(\text{Fe}_{3+2}(\text{Fe}_{2+})_3(\text{OH})_2\text{Si}_{822})$
Anthophyllite	Amphibole	$(\text{Mg, Fe})_7(\text{OH})_2\text{Si}_8\text{O}_{22}$
Amosite	Amphibole	$\text{Mg}_7(\text{OH})_2\text{Si}_8\text{O}_{22}$
(Actinolite)*	Amphibole	$\text{Fe}_7(\text{OH})_2\text{Si}_8\text{O}_{22}$
(Tremolite)*	Amphibole	$\text{Ca}_2\text{Fe}_5(\text{OH})_2\text{Si}_8\text{O}_{22}$
		$\text{Ca}_2\text{Mg}_5(\text{OH})_2\text{Si}_8\text{O}_{22}$

\*Although asbestiform tremolite and actinolite occur in nature, large commercially mined deposits are rare.

- The two main types of asbestos fibre are **serpentine** and **amphibole**.
- **Serpentine** fibres are curly like a snake.
- **Amphibole** fibres are needle like.

In practice, just knowing about **Chrysotile** (which is white), **Crocidolite** (which is blue), and **Amosite** (which is brown) is probably enough.

## History of asbestos use

### The ancients

- Plutarch (AD 46 - AD 120), a Greek author, describes eternal flames in the Acropolis being created with asbestos lamp wicks, in his book On the Decline of the Oracles.

- Pliny the Elder(AD 23 - AD 79), a Roman author, describes asbestos being used for table cloths, napkins, and burial shrouds, in his book Natural History.

## **Modern use**

PFC Joseph M. Theis demonstrating an Asbestos Suit. England, 9th March 1943.

Unscrewing of an AIB ceiling tile.

Damaged asbestos lagging on hot water pipes.

Asbestos cement corrugated roof.

## **Today**

Worldwide consumption rate of asbestos is 2 million metric tons per year.

Production and consumption continues in countries such as Brasil, Russia, India, China, and Iran.

Approximately 125 million people around the world work in environments in which they are exposed to asbestos, and at least 107000 people die from occupational exposure to asbesotos (WHO).

## Suggested reading and self directed learning

- Institute of Occupational Medicine Asbestos Guide
- Alleman, James E., and Brooke T. Mossman. “Asbestos revisited.” *Scientific American* 277.1 (1997): 54-7.
- International Agency for Research on Cancer; 2012. ASBESTOS (CHRYSTILE, AMOSITE, CROCIDOLITE, TREMOLITE, ACTINOLITE AND ANTHOPHYLLITE)