Types of Asbestos

Asbestos refers to six unique substances that belong to the serpentine and amphibole mineral families. These terms do not refer to mineral descriptions but to a broad term that refers to unique fibres. According to the Toxic Substances Control Act (TSCA), the asbestiform varieties of the following minerals are classified as asbestos:

Chrysotile

This is the most commonly used form of asbestos and can be found today in roofs, ceilings, walls and floors of homes and businesses. Chrysotile asbestos also was used in automobile brake linings, pipe insulation, gaskets and boiler seals. Although it is more prevalent, some studies show it takes more exposure to chrysotile than other types of asbestos to develop related diseases.

Amosite

This is known as brown asbestos, and it originates mostly in Africa. It was used most frequently in cement sheet and pipe insulation. It can be found in insulating board (which contained up to 40 percent asbestos), ceiling tiles and in thermal insulation products. Like the other forms of amphibole asbestos, it has needle-like fibres.

Crocidolite

This is blue asbestos and its known for having the best heat resistance. Mined mostly in South Africa, Bolivia and Australia, this is seen as the most dangerous type of asbestos. Crocidolite was commonly used to insulate steam engines, and it was found in some spray-on coatings, pipe insulation and cement products.

Tremolite

This is not used commercially, but it can be found as a contaminant in chrysotile asbestos, vermiculite and talc powders. It was occasionally found as a contaminant in certain asbestos-containing insulation products, paints, sealants and roofing materials. Tremolite can be white, green, grey and even transparent.

Anthophyllite

This type was mined primarily in Finland and displays a grey-brown colour. It was not commercially used and was rather found as a contaminant. Anthophyllite was most commonly found in composite flooring.
**Actinolite**

This form of asbestos has a harsh texture and is not as flexible as the others. It is most often found in metamorphic rock. Actinolite was never used commercially, but it can be found as a contaminant in some asbestos products. This classification was adopted by the U.S. Environmental Protection Agency (EPA) in 1976. The TSCA granted the EPA permission to regulate these six types of asbestos, and they have since been banned in 52 countries.

However, hundreds of other asbestos-like minerals have since been recognized by the U.S. Bureau of Mines, yet they are not restricted or regulated. Erionite and taconite are two minerals that contain asbestiform fibres with the potential to cause serious health problems.

All of the identified forms of asbestos are recognized as human carcinogens that can cause asbestosis, malignant mesothelioma, lung cancer, ovarian cancer, laryngeal cancer and other serious diseases. The EPA has abandoned projects that strive to identify which asbestos fibre types are the most toxic, citing that the overall regulation of asbestos and asbestiform minerals is a more pressing priority.

**Serpentine Asbestos**

Chrysotile is the only type of asbestos that is from the serpentine family and is known as white asbestos. These fibres are curly and are comprised of sheets of crystals.

Throughout industrial history, more than 95 percent of all asbestos used around the world was of the chrysotile variety. In many countries where other types of asbestos have been banned, the “controlled use” of chrysotile is still permitted. Despite the numerous studies that have proven chrysotile’s carcinogenicity, this exemption is the result of a long lobbying history by those in the asbestos industry.

**Chrysotile Asbestos**

Many studies have proven that exposure to chrysotile asbestos, commonly referred to as white asbestos, can cause a number of serious health conditions. While most commercial uses of asbestos in the United States have been of the chrysotile type, the use of this toxic mineral has declined significantly during the last few decades.

Naturally occurring deposits of chrysotile are often accompanied by trace amounts of tremolite (amphibole) asbestos, which is considered more toxic than chrysotile. However, several reports have indicated that exposure to solely chrysotile asbestos fibres can occur and such exposure can be equally hazardous as exposure to amphibole asbestos types.

Scientists from the National Institute for Occupational Safety and Health concluded that chrysotile asbestos should be treated with virtually the same level of concern as the amphibole forms of asbestos.

**Uses of Chrysotile**

In comparison to amphiboles, chrysotile fibres are generally finer with high flexibility and good heat resistance. Known as the most common asbestos mineral, chrysotile accounts for about 90 to 95
percent of asbestos used in commercial applications in the United States. This toxic mineral has been utilized in a number of products, including:

- Gaskets
- Cement
- Insulation
- Brake pads
- Brake linings
- Joint compound
- Roofing materials

Amphibole Asbestos

The other five types of asbestos are classified in the amphibole category. Amosite (brown asbestos) and crocidolite (blue asbestos) are considered the most commercially valuable types. Anthophyllite, tremolite and actinolite are the other non-commercial forms of amphibole asbestos. All amphibole fibres are straight and longer than chrysotile fibres, and studies suggest it may take less exposure to amphibole asbestos to cause mesothelioma than chrysotile asbestos.

Amosite Asbestos

According to the American Cancer Society, exposure to amosite asbestos creates a higher risk of cancer in comparison with other types of asbestos. Several asbestos studies suggest exposure to amosite can cause lung cancer, mesothelioma and asbestosis.

In its natural state, amosite is known as the mineral grunerite. Commercially, grunerite is referred to as amosite or brown asbestos. Approximately 80,000 tons of amosite were mined in the Transvaal province of South Africa by 1970.

Uses of Amosite

Amosite asbestos offer good tensile strength and heat resistance.

Commercial products that have been manufactured with amosite include:

- Cement sheets
- Thermal insulation
- Plumbing insulation
- Insulation boards
- Chemical insulation
- Electrical insulation
- Roofing products
- Fire protection
- Gaskets, lagging
- Tiles, including those for ceilings, roofs and floors
The U.S. Environmental Protection Agency (EPA) has determined amosite to be the second most commonly used mineral type of asbestos in the United States.

**Crocidolite Asbestos**

Multiple asbestos studies suggest crocidolite may be responsible for more deaths than any other type of asbestos because its fibers are so thin — about the diameter of a strand of hair. When airborne, these fibers can be inhaled easily and become lodged in the lining of the lungs, more so than other forms of asbestos forms. Once inside the body, the fibers do not break down easily. This can lead to potentially life-threatening lung and abdominal conditions, including lung cancer, mesothelioma and asbestosis.

These health risks are especially serious among crocidolite miners. An estimated 18 percent of crocidolite miners die from mesothelioma, research shows, and people living near crocidolite mines may also have increased risks for mesothelioma and other diseases.

The existence of crocidolite asbestos was first established in the early 1800s in South Africa. At the time, the mineral was known as “wooly stone,” but interest in the naturally occurring mineral didn’t take off until the 1880s, and large mining efforts of the material didn’t begin until the early 1900s.

Crocidolite is also known as “blue” asbestos. This form can be translucent or nearly opaque (which means light can’t penetrate it). The most common mining sites for this type of asbestos were Bolivia, Australia and southern Africa.

Today, crocidolite mining has virtually ceased because of both physical limitations and serious health risks. Crocidolite-containing materials are also more brittle than other amphibole asbestos products, meaning they break down sooner and can more readily lead to asbestos exposure.

Crocidolite is categorized as an amphibole, which is usually a needle-like mineral that forms in crystal groupings, either as fibers or columns. Typically, crocidolite fibers can be curved or straight. While brittle, the fibers are flexible enough to bend beyond 90 degrees before breaking.

**Uses of Crocidolite**

Like other types of asbestos, crocidolite was used to make a number of commercial and industrial products. It did have a drawback that other asbestos types did not: It is less heat-resistant, making it less useful for industrial manufacturing.

Some of the leading uses of crocidolite asbestos included:

- Ceiling tiles
- Fire protection
- Insulation boards
- Chemical insulation
- Spray-on insulation
- Acid storage battery casings
- Water encasement (enclosing)
- Cement sheets containing asbestos
- Electrical or telecommunication wires
• Thermal insulation (lagging and gaskets)
• Millboards (commercial ovens and steam pipes)

**Tremolite Asbestos**

Tremolite is an amphibole. Tremolite fibers have been useful for commercial products because they are strong, flexible, heat-resistant, and can be spun and woven into cloth.

**Uses of Tremolite**

Tremolite was used in a variety of commercial and industrial products because of its ability to insulate and fireproof materials. Some of the more common products that contained tremolite included:

• Paints
• Sealants
• Insulation
• Roofing materials
• Plumbing materials

Tremolite contains calcium, magnesium, silicon, hydrogen and oxygen. The mineral can be brown, grey, white or green and may appear to be transparent.

**Minerals That Contain Tremolite**

Rarely mined on its own, tremolite is often found in large amounts of other minerals such as talc and vermiculite. Researchers found that talc miners and millers are at higher risk for developing lung cancer and other respiratory conditions. When these minerals are used for industrial purposes, exposure to asbestos becomes a concern.

Talc is the softest known mineral on earth and is used for myriad industrial purposes including chalk, paints, rubber, cosmetics, ceramics and pharmaceuticals (for lung function). Most famously, this mineral is used for making talcum powder. Since 1973, U.S. laws require all commercial talcum products to be asbestos-free.

**Vermiculite**

Vermiculite is a mineral that expands when heated, a process called “exfoliation” or “popping.” This process forms a light-weight material used for industrial purposes including insulation, packing materials and soil improvement. Because vermiculite can contain large amounts of tremolite, exposure may increase a person’s risk of developing an asbestos-related disease.

This health risk is illustrated by the mining and milling operations in Libby, Montana, one of the United States’ largest sources of vermiculite. The tremolite-contaminated vermiculite at Libby was sold as Zolonite attic insulation, which the EPA estimates could be in millions of American homes. Because more than 70 percent of the vermiculite sold in the United States between 1919 and 1990 came from Libby, professionals recommend treating all vermiculite insulation as if it is contaminated with tremolite.
While some asbestos-containing vermiculite mines have been shut down in recent years, many vermiculite products that contain asbestos are still in use today.

Over the last century, vermiculite has been widely mined and processed worldwide for various construction, industrial and horticultural applications, as it is a superior insulator and filler material that is both lightweight and inexpensive.

Vermiculite compounds have been used for the following applications:

- Fertilizer carrier
- Potting soil additive
- Soil conditioner
- Attic insulation (loose-fill, commonly sold under the product name Zonolite)
- Acoustic finishes
- Spray-on insulation
- Concrete mixes for swimming pools
- Stucco
- Alternative to gypsum wallboard
- Plasterboard
- Packaging material (similar to styrofoam peanuts)
- Fireproofing material
- Whitewashes

**Anthophyllite Asbestos**

Anthophyllite asbestos is known to cause asbestos-related diseases, however, most studies indicate the risk of developing mesothelioma from anthophyllite exposure is much less than it is from exposure to other types of asbestos.

Although it took much longer for anthophyllite to be recognized as a mesothelioma risk than it did for amosite, chrysotile and crocidolite asbestos, there is a clear connection from exposure to it and to the development of mesothelioma.

**Uses of Anthophyllite**

Anthophyllite is one of the rarest types of asbestos and does not have a long history of commercial use. The mining of this mineral began in Finland in 1890. Since then, smaller deposits were mined in North Carolina and Georgia.

While considered to be among the non-commercial types of asbestos, anthophyllite has been used in products containing minerals such as vermiculite and talc.

Traces of anthophyllite may be present in talc and related products such as talcum powder.
Actinolite is an amphibole that is generally dark in colour. Actinolite (pronounced ak-TIN-uh-lyte) can appear in multiple forms such as dense and compact or brittle and fibrous, along with different colors, including white, gray, brown or green. The mineral’s name stems from the Greek “aktinos,” meaning “ray” or “beam,” stemming from its radiating fibrous form.

Actinolite is made up of other minerals and substances such as:

- Calcium
- Magnesium
- Silicon
- Oxygen
- Hydrogen

Uses of Actinolite

Actinolite is typically used with the similar mineral vermiculite, which expands when heated. Vermiculite and actinolite make for an effective, light-weight insulation material.

Other common uses for actinolite and vermiculite include:

- Insulation material
- Gardening
- Concrete materials used in construction
- Structural fire-proofing

Actinolite may still be present in buildings, homes or other locations that were constructed before asbestos was known to be a hazardous material.

This material has been found in products such as:

- Paints
- Sealants
- Drywall
- Joint compounds
- Children’s toys