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VI. Health

ASBESTOS AND ASBESTOSIS

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The Forms and uses of asbestos

Commercially important asbestos fibres fall into two main groups. The first of these is chrysotile, and the second comprises the amphiboles. Both groups are fibrous silicates, but they differ in geological origin, in chemical composition, in molecular structure, in fibre size and strength, and in other characteristics. Chrysotile., white asbestos, comes from many different places. There are slight chemical and physical variations in the fibres from different sources, but basically all have the same molecular structure. On the other hand, the amphiboles comprise at least three separate types, whose molecular structure is very similar, but whose chemical and physical properties differ more widely. Amosite (amber) and crocidolite (blue) are of commercial importance in this country, whereas anthophyllite is a Finnish fibre not used here.

The relative amounts of each fibre in world production is shown in the figure.

Asbestos

Annual world output—3,000,000 tons

Chrysotile (white)	Crocidolite (blue)	Amosite	Anthophyllite
2,800,000 tons	(South Africa)	(South Africa)	(Finland)
93%	110,000 tons	90,000 tons	10,000 tons
Canada 1,250,000	3½%	3%	⅓%
USSR 750,000			
S. Africa 250,000			
USA 100,000			
Europe 100,000			
Others 350,000			

World production of asbestos

The different characteristics of asbestos fibres dictate their uses, applications and their mode of packing and handling. For example, amosite can be pressure packed and palletized, whereas chrysotile lends itself more readily to containerization. By far the greatest use of chrysotile is in the asbestos cement industry. Amosite is used mainly in insulation and building products. Crocidolite, due to its excellent acid resistance, finds its major application in the manufacture of battery boxes in this country. It is added to the pitch mixture in unopened dissoluble bags.

Very broadly it can be said that current friction materials, whether they be disc brake pads, passenger car and commercial vehicle brake linings or clutch facings, contain 50 per cent chrysotile asbestos. The new trends of development, particularly in the fields of disc brake pads and commercial vehicle brake linings, indicate that the percentage of asbestos included in the mix is likely to decline. Some new materials now contain approximately 40 per cent asbestos, and newer mixes can be foreseen with an even lower percentage, probably down to a minimum of 30 per cent. The pads for disc brakes require less asbestos fibre than conventional drum brake linings. It is estimated that more and more passenger cars produced in the U.K. will in future be equipped with disc. brakes, particularly on the front wheels

The biological effects of asbestos

The variations existing in the biological effects of the different types of asbestos is the subject of considerable interest and research, and the extent to which the physical and chemical characteristics of the asbestos itself influence biological effects is being investigated. The role of trace elements and contaminants associated with the fibres has also to be considered.

The chief biological effects of asbestos are confined to the lung and pleura, or lining of the lung and chest cavity,

and to the peritoneum, or lining of the abdominal cavity. A few cases of skin corns have occured in asbestos workers, but these are becoming much less common.

All types of asbestos, if inhaled in fairly high concentrations over a considerable period of time, may cause fibrosis of the lungs. This disease, called asbestosis, consists of thickening of the lung membranes with resultant stiffening of the tissues and interference with oxygen uptake. The interference with gas transfer is the reason for the shortness of breath which causes the disability associated with asbestosis.

The amount of exposure required to produce fibrosis of the pleura, with or without calcium deposition in the scars, is more debatable. It may be that shorter, less concentrated exposures, particularly in youth, leave this mark upon the pleura. In any event this particular effect of asbestos inhalation causes little or no disability in itself.

Exposure to asbestos may lead to further complication, e.g. heart failure, cancer of the lung, or, rarely, to malignant changes in the pleura or peritoneum, known as mesothelioma. Cancer of the lung has been shown to be more common in asbestos workers who smoke, just as it is in the general population. Mesotheliomas are very uncommon throughout the world, but in some areas they have been associated more frequently with exposure to chrocidolite than to chrysotile, amosite or anthophyllite. The reasons for this are at present obscure, but are being sought intensively by investigators in many different countries.

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PHENOL (C_6H_5OH) AND ITS CARE

Although, to-day, Phenol is a basic raw material, used in large quantities by many industries, it was originally used as an antiseptic. Later phenol found use in the synthesis

of dyes, the newly discovered aspirin, and one of the first high explosives, picric acid.

Phenolic resins are now one of the most important applications of phenol. Their uses are wide and growing. They are used as moulding materials, laminates and adhesives; other derivatives of phenol go into the manufacture of plasticizers, pharmaceuticals, photographic chemicals, soaps, dyestuffs, germicides, preservatives, inks, paints, glues, textiles, explosives and weed killers. Phenol itself is widely used as a selective solvent in pertoleum refining.

Phenol having a flash point of 80°C, melts at 40-41°C and boils at approximately 180-182°C at normal atmospheric pressure. Phenol is flammable and its vapours mixed with air can be explosive.

Phenol is highly toxic and is readily absorbed even through intact (unbroken) skin. The greater the area of skin contaminated, the greater the danger. In contact with skin, phenol will cause painful or dangerous burns; and if left, it will be absorbed into blood stream. It is also toxic when swallowed or when its vapour is inhaled.

A few serious and fatal accidents were caused due to its improper handling and lack of knowledge regarding its toxicity and flamability. Recently one worker died in a factory while melting solid phenol contained in a drum without loosening its bung, on a naked flame.

Precautions :

1. Corrosive toxic chemicals should always be handled carefully by operatives who are fully informed on the characteristics of the materials and trained in the proper handling procedure.

2. Workmen who handle phenol should wear gas tight safety goggles or face mask, rubber gloves and rubber boots.