

INORGANIC FIBROUS MATERIALS AS SUBSTITUTES FOR ASBESTOS

MATERIAL : ATTAPULGITE

KNOWN BIOLOGICAL EFFECTS

- Membranolytic (1).
 - Cytotoxic to pulmonary macrophages (2).
 - Causes mesothelioma in experimental animals (3).
 - Adsorbs polycyclic aromatic hydrocarbons (4).
 - Lung fibrosis (1).
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INORGANIC FIBROUS MATERIALS AS SUBSTITUTES FOR ASBESTOS

MATERIAL : WOLLASTONITE

KNOWN BIOLOGICAL EFFECTS :

- Membranolytic (1)
 - Lung fibrosis, pleural thickning,
chronic bronchitis (2,3).
 - Morphologic and functional changes
in lung macrophages (4).
 - Impairment of lung ventilatory capacity (5, 6)
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NIOSH study

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INORGANIC FIBROUS MATERIALS AS SUBSTITUTES FOR ASBESTOS

MATERIAL : MINERAL (ROCK) WOOL

KNOWN BIOLOGICAL EFFECTS :

- Excess of cancer of trachea, bronchus and lung in production workers after 20 years of exposure. Risk of lung cancer is increased (SMR=192) 30 years after first employment (1) .
 - Among workers with 20 or more years of exposure in one European mineral wool production plant, significant excess of lung, bladder and skin cancer was observed (2) .
 - Among U.S. rock wool production workers, an SMR of 172 (14 deaths from lung cancer observed vs 8.1 expected) was noted (3) .
 - Possibility of an association of increased risk of cancer of the digestive system with exposure in rock wool production workers (4) .
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- 3- Enterline, P.E. and Marsh, O.M. (1982) // Biological Effects of Man-Made Mineral Fibers. Copenhagen. WHO Euro Reports and Studies 81.
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INORGANIC FIBROUS MATERIALS AS SUBSTITUTES FOR ASBESTOS

MATERIAL : REFRACTORY (CERAMIC) FIBERS

KNOWN BIOLOGICAL EFFECTS :

- Alumino-silicate (ceramic) fibers are both fibrogenic and cancerogenic, after administration in experimental animals by implantation and by inhalation (1) .
 - Intraperitoneal administration (25 mg) of man-made refractory fibers (mean diameter 1.8 μ) and of UICC crocidolite resulted in an incidence of 86% and 80% respectively of abdominal tumours (2) .
 - Under normal service conditions, alumino-silicate (ceramic) fibers can be transformed partly into free silica, cristobalite and mullite (3). These crystalline forms of silica have been reported to be even more fibrogenic than quartz (4).
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REFERENCES :

- 1- Davis, J.M.G. et al. (1983) // Biological Effects of Man-Made Mineral Fibres, WHO/IARC, Euro Reports and Studies 81 : p. 124
- 2- Schultz, D.L. (April 22, 1985) Sohio Engineered Materials Co. Letter to EPA, Washington, Re : FYI-OTS-0184-0288
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INORGANIC FIBROUS MATERIALS AS SUBSTITUTES FOR ASBESTOS

MATERIAL : GLASS FIBERS

KNOWN BIOLOGICAL EFFECTS :

- Causes mesothelioma in experimental animals (1 , 2) .
 - Effects in glass-dusted animals parallel those observed in asbestos-dusted animals (3) .
 - Small diameter glass fibers are as cytotoxic in cell systems as comparable size asbestos fibers (4) .
 - Small diameter glass fibers induce metaplasia in organ cultures of trachea, a condition predisposing to malignant transformation by carcinogens found in tobacco smoke (5) .
 - Glass fibers of respirable size can have an effect on the (human) lung similar to that of asbestos (6) .
 - Studies in fibrous-glass production workers are consistent with a growing number of animal studies which demonstrate a carcinogenic response to glass fibers less than 1 μ in diameter (7) .
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- 3- Miller, K. (1980) // Biological Effects of Mineral Fibers, Vol. 1 : 459-465, Ed. J.C. Wagner, IARC Pub. No. 30.
- 4- Tilkes, F. and Beck, E. G. (1983) Environ. Health, Perspect. 51 : 275-279
- 5- Woodworth, C. D. et al. (1983) Cancer Res. 43 : 4906-4912)
- 6- Chiappino, G. et al. (1981) Med. del Lavoro 72 : 96-101.
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ORGANIC FIBROUS MATERIALS AS SUBSTITUTES FOR ASBESTOS

MATERIAL : ARAMID FIBERS

KNOWN BIOLOGICAL EFFECTS :

- Cytotoxic to pulmonary macrophages (1).
 - Exposure of test animals to respirable fraction has caused slight fibrosis, and a low incidence of lung tumors (2).
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- 1- Dunnigan, J. et al. (1984) Toxicology Letters 20 : 277-282
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