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P-34-544

HEALTH ASPECTS OF FIBERGLAS MATERIALS

*This brochure is prepared for
distribution to plant physi-
cians, industrial hygienists,
safety engineers, and others
interested in a documented
summation of facts relating
to the health aspects of
Fiberglass materials.*

In the electrical and heat insulation fields, in the field of air filtration, and in other fields as well, Fiberglas is employed in many different ways and forms, for many different purposes. Because of its widespread use, and because it is a new material, it is to be expected that questions should arise from time to time concerning the possibility of health hazards in connection with its manufacture and handling.

For sound business reasons, Owens-Corning Fiberglas Corporation—the manufacturer of Fiberglas—has always desired to find and present frank and complete answers to such questions. To this end it has encouraged and aided investigations by impartial medical experts. This publication, which presents the answers to the questions which have arisen, is largely based on their investigations.

Gardner Tests conducted by Dr. Leroy U. Gardner, Director of the Edward L. Trudeau Foundation for Research and Teaching in Tuberculosis, have demonstrated that Fiberglas has no injurious effect upon the lungs.

The apparent lack of pulmonary drainage from the lungs to the right ventricle in birds is characterized by the observation that normally $1/2$ over a year animals have never been observed to exhibit a combination of both gross lung congestion and pulmonary emboli. In various species of birds, the lungs have been reduced to a size of 10% of the body weight, the heart enlarged to 15% of the body weight, and the lungs enlarged to 15% of the body weight. In the lungs of the birds, the heart is enlarged to 15% of the body weight, and the lungs are enlarged to 15% of the body weight.

In his 1941 report as director of the Trudeau Foundation², Dr. Gardiner says:

At the request of the attorney for the International Association of Rent and Real Estate and Associated Workers, Local Union No. 2, St. Louis, Dr. Walter J. Siebert conducted an investigation of possible health hazards in the manufacture and handling of Thermaplast.

The investigation covered a broad field. Study of the formulas employed in the manufacture and processing of Fiberglass products convinced Dr. Siebert that the chemical and physical characteristics of glass fibers are not of a kind from which serious industrial health problems would theoretically arise.

"In view of the continuously spreading war for Ethiopia against Italy and the latest campaign of the League of Nations against the scarcity of resources in the East, the importance of science and technology, and the lack of consciousness or interest in the sciences on the part of persons usually alert to practical business matters, should be attributed to lack of familiarity with the sciences and use of the sciences. On the contrary, it is against the common sense that the knowledge of the sciences is attended by the natural sciences and the arts."

On the basis of his own observation, and dust counts made in the Owens-Corning Fiberglass Corporation's plant, (See footnote 1), Dr. Seibert found that asbestos is considerably free of the dust that characterizes vermiculite products. This he attributes to the bonding of the fibers and the "back strength" of

1942-1943, 1944-1945, 1946-1947, 1948-1949, 1950-1951, 1952-1953, 1954-1955, 1956-1957, 1958-1959, 1960-1961, 1962-1963, 1964-1965, 1966-1967, 1968-1969, 1970-1971, 1972-1973, 1974-1975, 1976-1977, 1978-1979, 1980-1981, 1982-1983, 1984-1985, 1986-1987, 1988-1989, 1990-1991, 1992-1993, 1994-1995, 1996-1997, 1998-1999, 2000-2001, 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013, 2014-2015, 2016-2017, 2018-2019, 2020-2021, 2022-2023, 2024-2025, 2026-2027, 2028-2029, 2030-2031, 2032-2033, 2034-2035, 2036-2037, 2038-2039, 2040-2041, 2042-2043, 2044-2045, 2046-2047, 2048-2049, 2050-2051, 2052-2053, 2054-2055, 2056-2057, 2058-2059, 2060-2061, 2062-2063, 2064-2065, 2066-2067, 2068-2069, 2070-2071, 2072-2073, 2074-2075, 2076-2077, 2078-2079, 2080-2081, 2082-2083, 2084-2085, 2086-2087, 2088-2089, 2090-2091, 2092-2093, 2094-2095, 2096-2097, 2098-2099, 2100-2101, 2102-2103, 2104-2105, 2106-2107, 2108-2109, 2110-2111, 2112-2113, 2114-2115, 2116-2117, 2118-2119, 2120-2121, 2122-2123, 2124-2125, 2126-2127, 2128-2129, 2130-2131, 2132-2133, 2134-2135, 2136-2137, 2138-2139, 2140-2141, 2142-2143, 2144-2145, 2146-2147, 2148-2149, 2150-2151, 2152-2153, 2154-2155, 2156-2157, 2158-2159, 2160-2161, 2162-2163, 2164-2165, 2166-2167, 2168-2169, 2170-2171, 2172-2173, 2174-2175, 2176-2177, 2178-2179, 2180-2181, 2182-2183, 2184-2185, 2186-2187, 2188-2189, 2190-2191, 2192-2193, 2194-2195, 2196-2197, 2198-2199, 2200-2201, 2202-2203, 2204-2205, 2206-2207, 2208-2209, 2210-2211, 2212-2213, 2214-2215, 2216-2217, 2218-2219, 2220-2221, 2222-2223, 2224-2225, 2226-2227, 2228-2229, 2230-2231, 2232-2233, 2234-2235, 2236-2237, 2238-2239, 2240-2241, 2242-2243, 2244-2245, 2246-2247, 2248-2249, 2250-2251, 2252-2253, 2254-2255, 2256-2257, 2258-2259, 2260-2261, 2262-2263, 2264-2265, 2266-2267, 2268-2269, 2270-2271, 2272-2273, 2274-2275, 2276-2277, 2278-2279, 2280-2281, 2282-2283, 2284-2285, 2286-2287, 2288-2289, 2290-2291, 2292-2293, 2294-2295, 2296-2297, 2298-2299, 2300-2301, 2302-2303, 2304-2305, 2306-2307, 2308-2309, 2310-2311, 2312-2313, 2314-2315, 2316-2317, 2318-2319, 2320-2321, 2322-2323, 2324-2325, 2326-2327, 2328-2329, 2330-2331, 2332-2333, 2334-2335, 2336-2337, 2338-2339, 2340-2341, 2342-2343, 2344-2345, 2346-2347, 2348-2349, 2350-2351, 2352-2353, 2354-2355, 2356-2357, 2358-2359, 2360-2361, 2362-2363, 2364-2365, 2366-2367, 2368-2369, 2370-2371, 2372-2373, 2374-2375, 2376-2377, 2378-2379, 2380-2381, 2382-2383, 2384-2385, 2386-2387, 2388-2389, 2390-2391, 2392-2393, 2394-2395, 2396-2397, 2398-2399, 2400-2401, 2402-2403, 2404-2405, 2406-2407, 2408-2409, 2410-2411, 2412-2413, 2414-2415, 2416-2417, 2418-2419, 2420-2421, 2422-2423, 2424-2425, 2426-2427, 2428-2429, 2430-2431, 2432-2433, 2434-2435, 2436-2437, 2438-2439, 2440-2441, 2442-2443, 2444-2445, 2446-2447, 2448-2449, 2450-2451, 2452-2453, 2454-2455, 2456-2457, 2458-2459, 2460-2461, 2462-2463, 2464-2465, 2466-2467, 2468-2469, 2470-2471, 2472-2473, 2474-2475, 2476-2477, 2478-2479, 2480-2481, 2482-2483, 2484-2485, 2486-2487, 2488-2489, 2490-2491, 2492-2493, 2494-2495, 2496-2497, 2498-2499, 2500-2501, 2502-2503, 2504-2505, 2506-2507, 2508-2509, 2510-2511, 2512-2513, 2514-2515, 2516-2517, 2518-2519, 2520-2521, 2522-2523, 2524-2525, 2526-2527, 2528-2529, 2530-2531, 2532-2533, 2534-2535, 2536-2537, 2538-2539, 2540-2541, 2542-2543, 2544-2545, 2546-2547, 2548-2549, 2550-2551, 2552-2553, 2554-2555, 2556-2557, 2558-2559, 2560-2561, 2562-2563, 2564-2565, 2566-2567, 2568-2569, 2570-2571, 2572-2573, 2574-2575, 2576-2577, 2578-2579, 2580-2581, 2582-2583, 2584-2585, 2586-2587, 2588-2589, 2590-2591, 2592-2593, 2594-2595, 2596-2597, 2598-2599, 2600-2601, 2602-2603, 2604-2605, 2606-2607, 2608-2609, 2610-2611, 2612-2613, 2614-2615, 2616-2617, 2618-2619, 2620-2621, 2622-2623, 2624-2625, 2626-2627, 2628-2629, 2630-2631, 2632-2633, 2634-2635, 2636-2637, 2638-2639, 2640-2641, 2642-2643, 2644-2645, 2646-2647, 2648-2649, 2650-2651, 2652-2653, 2654-2655, 2656-2657, 2658-2659, 2660-2661, 2662-2663, 2664-2665, 2666-2667, 2668-2669, 2670-2671, 2672-2673, 2674-2675, 2676-2677, 2678-2679, 2680-2681, 2682-2683, 2684-2685, 26

Page 4 of "Report of the President of the National Association of Manufacturers" - Indemnity

The material, and to the fact that the glass fibers were broken down, rather than shattered when they were sawed, chopped or cut during production in the laboratory.

Dr. Siebert examined several hundred microscopic x-ray plates of the chests of employees in the Newark factory. These were selected at random by Dr. Siebert from the file of some 1500 plates taken since 1939 instituting the policy of making

x-ray plates of the chests of all Newark employees. Among the plates selected for special inspection were those of employees working in the batch house where the raw materials are handled. Beginning in May 1939, serial microscopic chest films had been made of the 15 men who were engaged in making the ingredients of the batch at the time of the investigation, or who had worked in the batch house—only place where exposure to free silica is encountered. A recent examination of all men was made in June 1941.

In the case, Dr. Siebert reports, "was there any radiographic evidence of pulmonary disease."

Three cases of silicosis contracted before employment by Owens-Corning had been discovered by the company. None of these men had ever been employed in the batch house, but their employment does require the handling of fibreglass products. It is the policy of the company neither to refuse employment, nor to discharge any man for whom safe employment can be found. The following summarizes the case histories of these three workers.

Case No. 1 worked for another company as a machinist from 1924 to 1929, and roentgenograms of the chest were made in 1929 because of the presence of tuberculosis in his family. Chest plates were again made in 1936 because of suspicion of silicosis. He was first employed by Owens-Corning on June 6, 1940.

Case No. 2 was employed as a bottle blower and machine operator from 1901 to 1930. He was first employed by Owens-Corning on March 26, 1941. Silicosis was diagnosed following an x-ray of the chest made on May 12, 1941.

Case No. 3 worked for 12 years as a mold maker for Glas Corporation on October 25, 1939. Silicosis was diagnosed following an x-ray of the chest on November 1, 1940.

In each of these silicosis cases, Dr. Siebert says in his report, "there is a significant causative factor in the man's previous employment history or other circumstances, and the evidence is entirely inadequate to indicate that the silicosis is entirely hereditary."

Records of all employees of the Division of Occupational Diseases, Bureau of Hygiene, and the Bureau of Investigation and Communication, U. S. Department of Health, are being reviewed in connection with the installation of fibreglass plants (Fiberglass) in the Navy Department ships had ever been reported, the Navy Department Bureau of Hygiene requested the Navy Department Bureau of Hygiene and Bureau of Investigation and Communication to make an

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This memorandum contained the following statements:

"No cases of silicosis or other disabling changes in the lung have been brought to the attention of the Division of Industrial Hygiene of the National Institute of Health in association with the handling of glass wool or glass fibers.

"It is concluded from observations, investigations and available literature that there is no appreciable health hazard associated with the handling of fibrous glass and slag wool in the blanket or board form."

health of Owens-Corning employees caused by the handling of Fiberglas products.

"... Relative to the use of Fiberglas, rock wool, or slag wool, I have discussed this matter very thoroughly with our Medical Department insofar as it applies to the installation of glass wool and its relation to silicosis, and I know of no better answer to give you than their direct statement:

"We may definitely state that this is not possible, based upon the established fact that silicates of which glass wool is composed will not produce silicosis or a similar condition.

- Free silica, which when inhaled in sufficient quantity will produce silicosis, is one of the ingredients of many varieties of cements. However, in the manufacturing process, the free silica chemically unites with other substances, leading to the production of silicates, and glass is a solid solution of free silica with silicates produced by the fusion of free silica with metallic oxides. Glass wool consists of glass in the form of very fine strands.

From time to time newly employed workers, unaccustomed to handling Fibreglas materials, have experienced a mechanical irritation of the skin. The period of discomfort has seldom exceeded a few days.

Manufacturing experience indicates that such irritation is minimized and the period of discomfort lessened if workers wear clothing

tion is assured if workers wear clothing and have plenty of warm food and water. This is done. The United States suggested

United States
use of a soap
in Lab. 414

is to remove persons having a right to the same.

Discussed in the Confidential Source File Sheet, Vol. II, pg. 11 (February 4, 1961).
A. L. Rostenberg, SA, dated 1/24/61 and dated 2/24/61.
This material is the property of the FBI and should not be furnished to anyone
in the absence of a written request for it, except to the extent of the
information of the subject material.

The Owens-Corning physician in charge of the medical dispensary at the company's plants and laboratories in Newark, Ohio, writes as follows:

[illegible]

Soap and water has proved most effective in removing particles of fibers, whether of glass or any other material, from the skin. The country has found that there is seldom, if ever, need of gloves, armlets or other protective clothing. In their absence, there is less likelihood that fiber particles will be rubbed into the skin.

Siebert Study of this occasional irritating
Investigation effect upon the skin comprised a
phase of the investigation under-
taken by Dr. Siebert on behalf of St. Louis Local
No. 1 of the Heat and Frost Insulators and Asbestos
Workers. (See page 2).

An examination of the wrists, arms, ankles, necks, eyes, shoulders and waists of approximately two hundred employees in the Newark Fiberglass factories was made by Dr. Siebert. These workers were employed on production lines and on fabricating operations, cutting, sawing, shaping, transporting and packaging glass thermal insulating wool, both bonded and unbonded.

No case of eye irritation or conjunctivitis was discovered during this inspection. Evidence of significant skin irritation was shown by only one worker, a man who had begun work in the plant four days before. Two biopsy specimens of skin were removed from the arm of this newly-employed worker.

Serial microscopic sections of this tissue examined by Dr. Siebert showed a mild degree of capillary dilatation in the corium of the skin. In addition, there were a few scattered lymphocytes around several of the dilated capillaries. The epidermis was entirely normal. No glass particles were found. Dr. Siebert reported no evidence of fibrosis, bacterial infection, allergy or hyperkeratosis.

Several of the serial sections revealed a small amount of a brownish pigment in the corium which showed no inflammatory reaction around it.

"It is assumed," says Dr. Herbert, "that this pigment is bilirubin, one of the substances used as a marker for the gallbladder. The fact that there was no change in body reaction around this indicates that this pigment is an inert substance, and that it does not produce either a harmful body reaction or a stress. The extremely mild inflammatory reaction is the outcome of the skin would result from any slight mechanical irritation."

File a letter dated June 28, 1964, from W. A. Campbell, 16 D. to Dr. Walter J. Sweeney.
The letter is dated June 28, 1964, from W. A. Campbell, 16 D. to Dr. Walter J. Sweeney.

Dr. Siebert summarizes his conclusions regarding this phase of his investigation in the following words:

"The author [Dr. Siebert] believes the following generalization is warranted by the evidence: Contact with glass wool may cause epidermal discomfort among workers inexperienced in handling the material. The skin irritation, however, caused is regarded as a progressive dermatitis, for it is non-healing and usually disappears in a few days. In extremely rare instances, where a worker may be subjected to secondary effects of mechanical skin irritation because of idiosyncrasy, allergy or the presence of foci of infection elsewhere in his body and otherwise associated with the effects of mechanical irritation, lesions may persist. But these cases are encountered with such rarity that they do not justify incriminating glass fiber as a causative factor."

Sulzberger-Baer Investigation During the spring and summer of 1942, Dr. Marion B. Sulzberger, Assistant Clinical Professor of Dermatology and Syphilology, New York Post Graduate Medical School, and Dr. Rudolf L. Baer, Junior Assistant Dermatologist and Syphilologist, New York Post Graduate Hospital, carried out an experimental investigation of the effects of Fiberglas on the skin of laboratory animals and human volunteers. A report of their investigation was published in the October 1942, issue of *Industrial Medicine*.

The laboratory animals used were rabbits and guinea pigs. Depilated sites on the animals were rubbed almost daily, except Sundays and several Saturdays, over a period of a month, with Fiberglas materials in both their wool-like and textile forms. Ten human subjects were rubbed daily, except Sundays, with the same materials, for periods ranging from seven to nineteen days.

Histological examination of the reaction sites in animals and human subjects showed evidence of a superficial inflammatory process. The histologic sections did not show any evidence of permanent damage, and the epidermis was generally found to be intact and undisturbed in its continuity.

Special methods of fixation which were designed to retain clinically visible glass spicules sticking into the skin, were used in the attempt to demonstrate these spicules in the histologic section. However, in none of the many slides examined could the glass spicules be seen.

"This," Dr. Sulzberger and Dr. Baer say, "together with the fact that no disturbance in the continuity of the horny layer of the epidermis was seen, suggests that the spicules which were seen clinically after the rubbings, were only very superficially embedded. No foreign-body reaction was seen in any of the sections examined, thus demonstrating that no fragments of the various materials used in these experiments had penetrated into the deeper layers of the skin."

Summarizing the results of the investigation, Dr. Sulzberger and Dr. Baer say:

"All of the reactions observed were of a temporary and superficial nature. The only part of the reactions which persisted for more than a few days were slight thickening and brownish pigmentation of

the skin. The latter were obviously apparent for several weeks after cessation of exposure, though the brownish discoloration was observed in only one during the observation period."

"The pieces of material which were used during the skin tests were not stored in airtight containers. The irritation was observed in the skin of the workers who were exposed to the dust of the material, and the irritation was observed in the skin of the workers who were exposed to the dust of the material, and the irritation was observed in the skin of the workers who were exposed to the dust of the material."

"The irritation of the skin from contact with glass fiber is of a purely transitory and superficial nature. Only the immediate skin area in contact with or rubbed with glass wool are slightly irritated, accompanied by a slight thickening of the skin, lasting at most for a few days. Minor areas sticking to the skin and appearing to be superficially embedded are readily removed by ordinary washing with water."

The Navy Department Bureau of Ships and Bureau of Medicine and Surgery Investigation of possible health hazards in connection with the installation of Fiberglas insulation in ships (see page 3), discussed the effects of Fiberglas upon the skin.

The section of the memorandum summarizing results of the investigation (dated December 30, 1942), which refers to skin effects, reads as follows:

"The irritation of the skin from contact with glass fiber is of a purely transitory and superficial nature. Only the immediate skin area in contact with or rubbed with glass wool are slightly irritated, accompanied by a slight thickening of the skin, lasting at most for a few days. Minor areas sticking to the skin and appearing to be superficially embedded are readily removed by ordinary washing with water."

Schwartz-Schwartz In an investigation of skin Report on the effects of the manufacture of Fiberglas and glass wool insulation, Dr. Louis Schwartz, medical director, and Dr. Joseph Schwartz, P.D. Surgeon, of the Division of Industrial Health, National Institute of Health, United States Public Health Service, reported the following:

"The hazard to workers using glass wool products for insulation and for other purposes has been due to the irritation of the skin by the glass wool. A few workers have developed dermatitis from contact with the wool. These workers, in such workers, were wearing gloves, inspection gloves, and aprons, they will be afforded adequate protection against these hazards."

"Workers handling glass fiber in textile manufacturing may develop dermatitis from the mechanical cutting action of the fibers on the skin, and a small percentage of them may develop an allergic dermatitis from the fibers. Irritation of the arms, neck, chest, and other parts of the body may be prevented by wearing inspection gloves and aprons. Irritation of the nasal mucosa may be prevented by inserting a blood gauze into the nostrils two or three times a day."

"According to an official of the company, the incidence of dermatitis in this plant was low, being in the order of 1% of the workers employed. No compensation cases were developed, indicating that the dermatitis is not serious. Some new employees experienced considerable irritation of the skin after a few days and may wear gloves or protective clothing at first, but on inspection were to develop

quickly as that the great majority of experienced workers prefer to work without gloves or special clothing. Exceptions are found among employees handling hot equipment, coarse filter fibers, metal lath, and other collateral materials of like nature. In the principal wool and textile departments, workers, according to management experience, report greater discomfort from gloves and protective clothing than from the material with which they work.

GENERAL HEALTH EFFECTS

No claim for workers' compensation based on a pulmonary industrial disease or disability resulting from an occupational skin disorder attributable to Fiberglass as differentiated from other materials, has ever been validated in the State of Ohio, where manufacture has been centered since 1932. The number of employees in the Ohio Fiberglass factories has risen from about 20 in 1932 to several thousand, whose total exposure aggregates millions of man-hours. In addition, exposure in Ohio includes several thousand employees in the factories of refrigerator and range manufacturers where Fiberglass insulating materials have been handled on assembly lines.

Compensation. Ohio's workers' compensation assessment law (assessed against the employer per \$100 of wages) for men and women engaged in the manufacturing and handling of Fiberglass are lower than in most comparable industries, as is shown in the following figures, which are recorded in Exhibit II, Dr. Robert's report:

Fiberglass textile employees	\$.05
Fiberglass insulating wool employees	\$.05
Asbestos manufacturing	1.00
Rubber manufacturing	\$1.00
Fiber goods manufacturing	\$1.10
Carbonate of magnesia manufacturing	\$1.20
Building Material dealers' employees	\$1.60
Clay products manufacturing	\$1.60
Paper manufacturing	\$2.00
Wood pulp mills	\$2.00

Health Record. The health of Fiberglass workers is regarded as better than average by the Aetna Life Insurance Company, which underwrites group insurance (life, disability, sickness, and hospitalization) for employees of Owens-Corning Fiberglass Corporation. In a letter to an Owens-Corning executive, dated June 11, 1941, Aetna's Toledo general agent wrote, in part, as follows:

"The health of your workers is better than average."

extremely low pain and no child has ever been produced, indicating, of course, that there is no hazard to the use of Fiberglass or any of its products."

Surgical Uses. Several surgical uses of Fiberglass de-O-Fiberglass threads in recent medical literature have been reported. It has been demonstrated the fact that glass is an inert substance which produces no harmful effect on human tissue.

The use of a strand of de-O-Fiberglass yarn as a suture thread that makes it possible to detect the presence of a surgical wound is set in a wound suture operation, is described by Captain Edward J. Condon, Medical Corps, United States Army, who writes:

"... I undertook to find a safe surgical suture one that would not give a permanent X-ray shadow and, thus, could be readily detected by an X-ray film. It was not until the recent development of Fiberglass thread that a practical and important solution to this problem was found."

This specially prepared Fiberglass yarn was found to embody the following qualities:

1. Marked radio-activity
2. Minimum tissue reaction
3. Chemical inertness
4. Physical properties of pliancy, delivery and appearance resembling a fine silk thread
5. Reasonably low cost of production

"Like glass, which is the basic component of its composition, this thread is chemically, physically, and biologically inert, yet unlike glass it is a thread of exceptional strength, pliancy, and workability."

"It is the superior strength, pliancy, and workability of this specially prepared Fiberglass yarn that should be observed and appreciated in the developed which was permanently inseparable in the X-ray and perfectly harmless to body tissue as well."

"No more than one suture thread per suture is required. This reduces the cost of production and thereby enhances the practical virtues and expediency of this type of safe surgical suture."

"The essential characteristics of a suture as defined by the American College of Surgeons are as follows:

1. Ability to absorb the greatest quantity in the shortest time
2. Ease of sterilization
3. Freedom from loose threads
4. Uniformity
5. Softness, to prevent trauma
6. Freedom from foreign substances

"... With the innovation of 'rayable' surgical gauze these general standards remain unaltered. Radio-opaque thread is soft, sterilizes readily, and as a single strand could hardly change the absorbent quality of a sponge or pad. It characteristic (6), in the classification of the American College of Surgeons, 'Freedom from foreign substances,' is constructed as ensuring freedom from harmful, and toxic foreign substances, then this de-O-Fiberglass yarn qualifies within the interpretation of this essential characteristic."

Dr. Roy Philip Schuch and Dr. Philip S. Mountjoy report the use of Fiberglass thread as a suture material in the treatment of surgical wounds.

The following is a summary of the results of the use of Fiberglass thread in the treatment of surgical wounds.

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in the tissue and practically insoluble. It does not cause irritation, edema, or cell proliferation, and it is in no wise interfered with wound healing.

It is not affected by gastric fluids, pancreatic action, or action of chemicals; neither does it produce toxins or allergic reaction. The fact that each fiber is an extremely fine, solid filament of pure glass, makes it non-absorbent, and in view of its being a non-irritant, it does not call forth those fluids which would harbor germ life.

A third surgical use of Fiberglas deserves mention because of the part it is playing in helping to save the lives of men of the fighting services who are wounded in battle. From all the war fronts comes word that blood plasma transfusions are proving to be one of the greatest single factors in radically reducing the number of wounded who succumb to their wounds in this, as compared to other wars.

A small strip of tape woven of glass fibers, is used as a filter in the tubing of the light portable apparatus used to give the transfusions—frequently just behind the front lines. Through this strip of Fiberglas tape all the plasma fluid passes on the way from the plasma bottle to the wounded man's veins.

The Fiberglas tape is used as the filter because the tape can be sterilized for repeated use, because

it requires no bulky housing, because the weave is close enough to strain out any undissolved particles that may be present, and because, being glass, the tape is not affected when wet, thus offering no hindrance to the free passage of the fluid.

PHYSICAL AND CHEMICAL PROPERTIES

The raw materials of which Fiberglas is composed consist of siliceous oxides. The raw material of these materials is true glass, which is processed into a radically new form.

Chemically, Fiberglas is similar to stone and mineral wool. It can properly be classified as a refined form of mineral wool. The fact that other forms of mineral wool (rock wool and slag wool) have been used for many years, in itself strongly suggests that there is nothing in the inherent chemical and physical characteristics of Fiberglas that is likely to introduce any serious occupational hazard.

Fiberglas contains no free silica; no free sodium silicate. No carcinogenic hydrocarbons or other hydrocarbons can be present because of the extremely high temperatures employed in fusing the raw materials. No harmful fumes can be given off, since no substances are present which will volatilize within the recommended service ranges.

Warner Type Fiberglass Cloth 210 is Formulation of Fused Glass Cloth by Sargol
Company, Inc. 1952, pp. 26-27.

HEALTH ASPECTS OF TUBERCULOSIS MATERIALS

SYMPTOMS AND DIAGNOSIS

LUNGS AND RESPIRATORY TRACT

The lungs are the primary site of infection in tuberculosis. The bacteria enter the lungs through the air and settle in the alveoli. The immune system responds by forming granulomas to contain the bacteria. This process can lead to the formation of tubercles, which are small, nodular lesions. In some cases, the bacteria can spread to other parts of the body, such as the lymph nodes, bones, and organs.

The symptoms of tuberculosis are often non-specific and can include a persistent cough, chest pain, weight loss, and fever. A sputum test can be used to detect the presence of bacteria in the lungs. In some cases, a chest X-ray or CT scan may be necessary to visualize the lungs and identify any abnormalities.

The treatment of tuberculosis typically involves a combination of antibiotics, such as isoniazid, rifampin, and pyrazinamide. These drugs are designed to kill the bacteria and prevent them from multiplying. Treatment is usually continued for several months, even if the symptoms improve, to ensure that the bacteria are completely eradicated.

In some cases, the bacteria can become resistant to the standard treatment. This is known as drug-resistant tuberculosis. In these cases, more potent and often more toxic drugs may be required. Close monitoring by a healthcare provider is essential to ensure that the treatment is effective and to manage any side effects.

Prevention of tuberculosis is possible through vaccination and by avoiding contact with infected individuals. The BCG vaccine is commonly used in many countries to protect against the disease. In addition, maintaining good hygiene and a healthy lifestyle can help reduce the risk of infection.

It is important to seek medical attention if you experience any symptoms of tuberculosis. Early diagnosis and treatment can significantly improve the outcome of the disease and prevent complications. Public health measures, such as screening and contact tracing, are also crucial in controlling the spread of the disease.

The health aspects of tuberculosis are complex and multifaceted. A comprehensive understanding of the disease requires a combination of clinical, laboratory, and public health approaches. Continued research and innovation are needed to develop more effective treatments and prevention strategies.

By following the advice of healthcare providers and taking necessary precautions, the risk of tuberculosis can be reduced. It is a disease that can be managed and, in many cases, cured. Staying informed and proactive about your health is the best way to protect yourself and others.

The health aspects of tuberculosis are a topic of ongoing research and discussion. As our understanding of the disease evolves, so will the strategies for its prevention and treatment. It is a global health challenge that requires a coordinated effort from scientists, healthcare providers, and the public.

In conclusion, tuberculosis is a serious but manageable disease. By recognizing the symptoms, seeking timely medical care, and adhering to the treatment plan, individuals can achieve a full recovery and return to a healthy life. The health aspects of tuberculosis are a testament to the power of medical science and the importance of public health measures.

The health aspects of tuberculosis are a complex and multifaceted issue. It requires a holistic approach that considers the individual, the community, and the environment. By working together, we can effectively combat this disease and protect the health of future generations.

The health aspects of tuberculosis are a topic that should not be overlooked. It is a disease that affects millions of people worldwide and has the potential to cause severe complications. By staying informed and taking necessary precautions, we can reduce the impact of this disease on our lives.

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PREVENTION IN SURGERY

Prevention of tuberculosis in surgery is a critical aspect of patient care. The risk of infection is high, and the consequences can be severe. Surgeons and healthcare providers must take all necessary precautions to minimize the risk. This includes wearing masks, gloves, and gowns, as well as using sterile techniques throughout the procedure. In addition, patients should be screened for tuberculosis before surgery, and any positive results should be addressed before the procedure. The use of antibiotics and other preventive measures may also be necessary. It is essential to maintain a high level of vigilance and follow all guidelines to ensure the safety of the patient.

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HANDLING CHARACTERISTICS

Handling characteristics of tuberculosis materials are crucial for ensuring the safety of healthcare workers and the public. These materials, which may include sputum, blood, and other bodily fluids, must be handled with extreme care. Healthcare workers should wear appropriate personal protective equipment (PPE), such as masks, gloves, and gowns, and follow strict protocols for disposal and decontamination. The use of biohazard symbols and labels is also essential to warn others of the potential danger. Proper training and education are necessary to ensure that all personnel involved in the handling of these materials understand the risks and the correct procedures to follow. By adhering to these guidelines, the risk of infection can be significantly reduced, and the health of everyone involved can be protected.

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