CHEMISTRY

Soft Woods Made Hard

Ordinary wood converted chemically into harder grades with natural tendencies to swell, shrink and warp eliminated. New product is stronger and durable.

See Front Cover

➤ SOFT WOODS become harder than hard maple and maple wood is made harder than ebony by a new chemical process announced by Dr. J. F. T. Berliner of E. I. du Pont de Nemours & Company. The Du Pont announcement stated that it is a development by chemists of the company following a line of research that paralleled studies conducted by the Forest Products Laboratory of the U. S. Department of Agriculture.

This process makes timber markedly harder, stronger, stiffer and more durable, it is claimed. The natural tendency of wood to swell, shrink or warp with changes of humidity is eliminated. Furniture, for instance, made of the transmuted wood can be shipped throughout the world, to tropical jungles or arid deserts, and will remain in condition. Color may be imparted permanently throughout the material by the use of dyes in the impregnating material.

Four of the ways in which the treated wood is superior to the untreated are graphically illustrated by the pictures on the cover of this SCIENCE NEWS LETTER.

The test pictured at top left shows why drawers, doors and windows made of lumber treated by the new chemical process will not stick when the weather is damp. Brass rings were slipped on identical treated and untreated dowels, and the dowels placed in water for about 24 hours. Water swelled the untreated core piece so that the brass ring could not be removed. The treated dowel showed no observable dimensional change, and the ring slipped freely up and down the shaft.

In the experiment illustrated in the top right picture a stick of wood was ignited at the junction of treated and untreated pieces. The untreated piece burned, but the transmuted piece did not support combustion and was charred only where the fire made contact.

The increased hardness of the impregnated wood is shown by the lower left picture. The block of wood on the left does not have nearly as deep an indentation from the "C" clamp as the untreated block on the right.

The improved warp resistance of treated wood was quickly demonstrated as illustrated in the lower right picture by laying untreated (left) and treated (right) veneers on a wet towel.

The chemical agent used in this new process is called methylolurea and is made by compounding urea with dimethylolurea. Both these materials are white, water-soluble solids, produced from ammonia, carbon dioxide and methanol, more commonly known as methyl alcohol. Urea results from the reaction of ammonia and carbon dioxide. Formaldehyde, derived from methanol, condenses with urea to form dimethylolurea. Both urea and dimethylolurea are inexpensive chemicals available commercially.

The methylolurea is impregnated into the wood in a water solution. It reacts with the components of wood to form hard, water-insoluble, unmeltable resins within the piece of timber being treated. Heat, such as kiln drying, speeds the process.

The treatment can be used also to harden the outside portion of a piece of lumber without affecting the interior, obtaining results somewhat similar to those obtained in case-hardening steel. This treatment will be found desirable for certain types of construction such as trestles, bridges and towers.

Research on the hardening of soft woods by means of methylolurea conducted at the U. S. Forest Products Laboratory at Madison, Wis., eventuated in patent 2,298,017, issued Oct. 6, 1942, and patent 2,313,953, issued March 16, 1943. Rights in both these patents are vested in the Secretary of Agriculture, and the processes covered are open to public use.

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MINERALOGY

Fine Quartz Filaments Made With Bow and Arrow

➤ QUARTZ filaments, so fine that it would take 60 of them to make the thickness of a human hair, are drawn out in production in a relatively new method by use of a bow and arrow at the Westinghouse Research Laboratories. These superfine filaments are used to measure, or calibrate, the magnifying power of the electron microscope.

The bow, made of tough flexible steel, is mounted on a wooden stock. The arrow is shot out along a groove in the stock. In action the crossbow is placed in firing position and a small cylindrical piece of quartz attached to the rear end of the arrow. The quartz is heated by an oxy-hydrogen torch until it is just ready to melt. Then the arrow is released, trailing behind it as it goes gossamer-like threads of quartz. These are sometimes 20 feet in length.

To make this delicate thread a high initial burst of speed is required to spin out the quartz while it is in a hot fluid state and before it has a chance to harden. The crossbow does the trick.

Science News Letter, April 29, 1944

PHYSICS

X-Rays Measure Thickness Of Steel at 20 M.P.H.

➤ INVISIBLE X-ray fingers can measure the thickness of white-hot steel sheets squeezed out between rolls at a

MODERN WILLIAM TELL — Quartz filaments 1/30,000 of an inch in diameter, which are used as "measuring sticks" for the magnifying power of the electron microscope, are made with this cross bow in the Westinghouse Research Laboratories.

speed of 20 miles an hour and can do it so accurately that the rolling process can be controlled precisely by the X-rays themselves so as to keep the thickness the same.

Dr. William D. Coolidge, General Electric vice-president in charge of research, in receiving the prized Franklin medal at the Franklin Institute in Philadelphia, announced this newest development of the X-ray tube that bears his name.

Aside from their original medical uses, Dr. Coolidge said, X-rays now help make chemical analyses, measure distances between the atoms to determine crystal structure, reveal hidden flaws in steel and other material, detect strains in materials that might lead to failure, reveal the composition of very thin metallic specimens and delicate botanical and zoological tissue.

Million-volt X-rays are doing war work by inspecting welds and steel castings as thick as eight inches, Dr. Coolidge said, and they can do in two minutes what 400,000 volt X-rays took 3½ hours to do.

A Franklin medal was also awarded to Dr. Peter Kapitza, the Soviet physicist, who has been a leader in production of high magnetic fields and in liquefaction of gases.

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MEDICINE

Alcohol Rub Cures Boils

New 20-minute treatment gives complete and apparently permanent relief from infection. Number of successful cases too small for definite conclusions.

➤ COMPLETE, usually sudden and apparently permanent cure of boils by a new treatment consisting simply of a 20-minute alcohol rub is reported by Dr. Philip B. Price, of the University of Utah School of Medicine. (*Journal, American Medical Association,* April 22)

Dr. Price makes no claims for the method of treatment, he says, since the number of cases in which it has been used is too small for final conclusions as to its efficacy. Of many patients given this treatment in the last 10 years, he reports on 11. All of these had a more or less continuous succession of deep-seated boils occurring over a period of weeks or months. All had been treated unsuccessfully by other methods. All were followed for two years or more after the alcohol treatment. None had any further boils during this period.

The treatment should be given in the interval between the healing of the last boil and the onset of the next one, Dr. Price advises. The rubbing is done gently with gauze. A solution of ethyl alcohol 70% by weight, not volume, is used.

The treatment is based on Dr. Price's belief that one boil follows another because germs of the first one are smeared over the skin surface by discharges, sweat, bathing and friction. They become part of the germ population that resides permanently on the skin. There they may live and multiply without harm until by chance some of them are rubbed deeply into a hair follicle, whereupon a new boil develops.

Assuming this theory to be correct, rational treatment would consist in an attempt to sterilize the skin, that is, to rid it of all microorganisms, Dr. Price points out. Previous studies have showed that healthy skin can be "degermed" with the ethyl alcohol solution which Dr. Price found effective in curing boils. Harsher germ killers, such as iodine and carbolic acid, are likely to do more harm than good, he says.

Sulfa drugs, it is his impression, have not been very successful in treating boils.

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ARCHAEOLOGY

Pumpkins Tell Story Of Old Indian Cultures

➤ TRACING a story through the dim remoteness of unrecorded time was the task undertaken by Dr. George F. Carter of the Johns Hopkins University, when he tried to trace the unwritten history of American agriculture from tribe to tribe of Indians by checking up on the kinds of pumpkins and squashes they grew, reported at the Philadelphia meeting of the American Philosophical Society.

Pumpkins and squashes are all close botanical relatives, and all native American plants. At some time or other, some tribe began growing them, and selecting the seeds of the biggest and best kinds for further propagation. Related or neighboring tribes caught the idea, and it spread over a wide area.

Dr. Carter has found evidences, largely in old Indian graves and dwelling sites, that the domestication of squashes and pumpkins was started in a number of places quite independently of each other. One group, for example, spread the cultivation of the plants over the eastern United States, while another started on the west coast of Mexico.

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