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.

Science News Letter, April 29, 1944

MINERALOGY

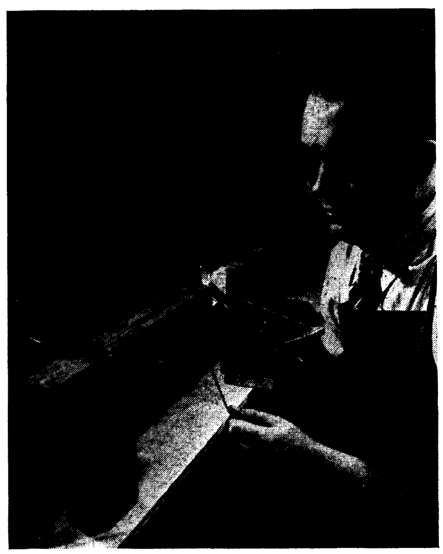
Fine Quartz Filaments Made With Bow and Arrow

➤ 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



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.

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