PHYSICS

Work "Unusable" Metal

Alloy of aluminum and iron changed from laboratory curiosity to usable metal by high heat, and it can then be cold-rolled. Has excellent "soft" magnetic properties.

➤ A HERETOFORE "unusable," rock-hard magnetic material can now be worked, the U. S. Navy revealed, promising size and weight reduction of some airborne equipment, better home tape recorders and improvement of electronic "brains."

The metal, 16-Alfenol, an alloy of aluminum and iron, was shown in an on-the-spot demonstration to 40 winners of the national Science Talent Search at the Naval Ordnance Laboratory near Washington.

Merely by heating the material to a temperature of 1,067 degrees Fahrenheit, it can be changed from a laboratory curiosity into a usable metal of great strategic value to the U. S. It can then be subjected to a cold-rolling process that does not harm its desirable properties.

Although Japanese scientists previously had noticed that a 16% aluminum-84% iron combination showed excellent magnetic properties, they were baffled by the metal's extreme brittleness and unworkability.

But Navy scientists in NOL's magnetics division learned how to make the atoms of aluminum slip into place among atoms of iron in such a way that the metal could be turned out as a flexible ribbon only 25 ten-thousandths of an inch thick.

The resulting material shows excellent "soft" magnetic properties. That means a tiny electric current can magnetize the metal easily, but that the metal will not hold its magnetism very well after the current has been turned off.

Carroll W. Lufcy, head of the magnetics division, hailed the new process as "one of the most significant developments in the field of soft magnetic materials in a long time."

He pointed out that the material does a better job in certain applications than silicon steel now widely used in transformer cores. Furthermore, it is lighter and comes out of the process with a ready-made insulation. Silicon steels usually must be insulated in a separate process before they can be used in transformer cores.

The metal shows further promise where high frequency electric current is involved. Thus 16-Alfenol, named after its non-critical chemical components, aluminum and iron, and the Naval Ordnance Laboratory, may work well in giant electronic computers which solve fantastic problems in split seconds.

Because of its great resistance to undesirable electric currents set up in transformer cores, the new material also should allow a weight reduction in transformers and similar equipment needed in aircraft. This, in turn, could improve the performance of Air Force planes.

But even though the metal is ductile after being worked, it still retains its hardness. This means that the metal "may be a natural" for magnetic tape recorder heads which wear down slowly as miles of tape scrape over them.

Science News Letter, March 7, 1953

NATURAL RESOURCES

Water-Grabbing Plants

➤ WATER-WASTING PLANTS are grabbing off up to 25,000,000 acre-feet of water per year in 17 western states, T. W. Robinson of the U. S. Geological Survey reported to the Geological Society of Washington.

Phreatophytes, useless trees and shrubs whose roots reach into or near the water table, are responsible for this useless water consumption. They cover about 16,000,000 western acres and squander an amount of water about twice the average flow of the Colorado River at Lees Ferry, Ariz.

Some 50 species of plants—including alder, cottonwood, mesquite, willow, saltcedar and saltgrass—make up the phreatophytes. They pump up or lift ground water, sometimes from great depth, and dissipate it as vapor into the air.

Such "consumptive waste" probably represents the "largest source of reclaimable water in the arid western states," Mr. Robinson said, summing up many years' work on the water-wasting plants.

Use of chemical sprays, such as 2,4-D and 2,4,5-T, is a promising and relatively inexpensive method of destroying the phreatophytes over large areas.

Not all phreatophytes are water grabbers. One, alfalfa, is an important agricultural plant. His waste figures, Mr. Robinson pointed out, do not include water used by alfalfa and other beneficial plants.

Salvage of the wasted water is divided into two basic operations: (1) Reduction of waste, by rapid lowering of the water table either with pumps or by drainage, thus depriving the roots of water; and (2) Increased efficiency of use, as by substituting plants of high economic value, such as alfalfa, for those of low economic value, such as cottonwood.

Science News Letter, March 7, 1953

• RADIO

Saturday, March 14, 1953, 3:15-3:30 p.m. EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Dr. William T. Sanger, president of the National Society for Crippled Children and Adults, president of the Medical College of Virginia, Richmond, discusses "How Easter Seals Help Crippled Children."

CHEMISTRY

Protein Structure Secret Is Unraveled by Chemists

➤ UNRAVELING OF the secret structure of proteins, the basis of life, has been carried one step further in the laboratories of Drs. Linus Pauling and Robert B. Corey at the California Institute of Technology.

Nucleic acids have been found to have a complex twisted form, in which three spring-shaped molecular chains are intertwined.

Understanding the structure of proteins and nucleic acids will make it easier to make these life materials artificially, or to understand disease processes involving living tissues.

Nucleic acids are chemically simpler structures than hair and feathers. Those tissues, which are modifications of skin cells, were recently analyzed by the same scientists. (See SNL, Jan. 31, p. 57.) They were found to have spring-like, helical shapes. Nucleic acids have now been found to have shapes somewhat similar.

Hair and feather molecules combine a left-hand twist of individual strands with a right-hand twist of the whole rope-like fiber. Nucleic acids, on the other hand, are reported to have about 24 molecular groups strung on seven turns of the helix, which is twisted like a right-hand screw.

Location of the individual molecular groups has been mapped by Dr. Pauling and his assistant. He will report his complete findings soon, both by publication and in person to the National Academy of Sciences in Washington.

Science News Letter, March 7, 1953

GEOLOGY

New Uranium Mineral Discovered in India

➤ A NEW radioactive mineral containing uranium and thorium has been discovered in India, geologists S.H.U. Bowie and J.E.T. Horne have told the British Department of Scientific and Industrial Research in London.

The mineral contains 31% thorium oxide and 4% uranium oxide, both radioactive materials. The deposit is much too small to be of commercial importance.

Finds of new mineral species are extremely rare. This one is called cheralite, for Chera, the area in India where it was discovered, and it is closely related to monazite, the commonest ore of thorium.

Science News Letter, March 7, 1953