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Scotch, Other Dilutants Change Ice Properties

The fact that ice cubes stick together in ice water but not in Scotch whiskey and water hasn’t greatly affected the popularity of either beverage. It is of semantical interest, however, to write about it in a new laboratory at the Massachusetts Institute of Technology. In fact, alcoholic beverages are being studied experimentally in the Ice Research Laboratory, where scientists are seeking to put to work the “most plentiful and so far the least useful” substances on earth—ice and snow.

Dr. W. David Kingery, head of the laboratory, said its studies represent a new field of research which he has named “applied glaciology.” It is aimed toward developing practical methods for using ice and snow in inexpensive large-scale materials in Arctic regions.

Dr. Kingery, an associate professor of ceramics in the MIT Metallurgy Department, said the laboratory is already finding ways—including the addition of alcohol and other substances—to improve processing methods and to make stronger and more useful ice. (Alcohol aids in cleansing ice grains so that they fit together better.) He predicted that engineers would be building practical structures out of ice in two to three years as a result of advancing research in this field. Professor Kingery returned last week from a three-week trip to Point Barrow, Alaska, where he supervised a field program of the Arctic Institute of North America on the building of ice structures.

“The basis for the new studies,” he said, “is that too much of the earth’s surface is covered by ice and snow. The snow-covered areas and the oceans are the two great terrestrial frontiers which have not been fully explored; in some minds they offer much more hope for exploitation than does outer space. But development of the earth’s cold regions can only be achieved when the local environment, including ice and snow, is positively used rather than passively fought.

“In the need for research lies the fact that ice and snow as found in nature seldom have the properties required for modern construction. Professor Kingery said.

“Ice and snow have been used as construction materials by residents of cold climates for a long time.”

“Applications have included snow houses, ice logging roads and ice sidewalks, and snow storage, and ice storage in logging and operations and others. In all these, however, the requirements as to structural properties are not stringent and the applications have been limited to the use of natural, unprocessed materials.

Western Electric has also been making use of ice. It was used, for example, in the building of cryogenic tanks for the atomic energy commission. Western Electric made the tanks and the equipment, but they were not the only use of ice. The tanks were made of ice and snow in their natural state. But he called it a “stone age” activity because no processing methods had been developed to point where wisely used construction and fabricating techniques are available for on-the-spot building.

Studies of ice “alloys,” which now appear to be one of the most promising avenues of research, have been limited, according to Professor Kingery. The only serious consideration given the problem was the development of ice-asbestos mixtures during World War II in connection with British plans to build a 2-million-ton aircraft carrier out of ice. The addition of about 15 per cent sawdust, it was found, more than tripled the tensile strength of the ice. Other and important alloys developed by Professor Kingery are ice-Fiberglas mixtures. Ice, which contains as little as four volume per cent Fiberglas in 10 times stronger than pure ice. Natural ice has a tensile strength of 300 pounds per square inch, whereas one Fiberglas ice alloy has a tensile strength of 3,000 pounds per square inch.

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