NATURAL RESOURCES

Sea Water To Fresh Water

Ocean brine, with salts removed, may be used to meet domestic demands. Compression distillation, chemical methods and refrigeration are possible ways.

➤ SCIENTISTS are looking toward the ocean to get additional fresh water to meet increasing demands made by homes, industry and agriculture. Congress is now considering an appropriation to investigate possible commercial methods of getting drinkable water from the ocean brine.

The supply of fresh water from the usual sources is not inexhaustible, as many suppose. The underground water level is getting lower and lower in many parts of the United States. A crisis is foreseeable. The increasing population and the tremendous amount of water now used in industrial operations and irrigation are responsible for the impending shortage. There is plenty of water in the oceans. The problem is to freshen it, and to do so at reasonable cost.

Ordinary distillation is the long-used process, and many vessels at sea operate shipboard stills to get their fresh water from the ocean. The process, however, is too costly to use for getting a city domestic supply. A more economical method is essential. The proposed investigation would concern itself with all possible methods, both chemical and physical.

One possible method, known as the vapor compression distillation process, has been developed by Arthur D. Little, Inc., Cambridge, Mass. It was tested on a large scale by the armed forces during the war. Over 1,000,000 men were supplied with fresh water from sea water on islands in the Pacific and on the mainland beachheads. Overall cost of this method is about one dollar for 1,000 gallons. Further refinements of the method may make the cost lower.

In compression distillation, a little preliminary heat is used to get a small amount of steam. This steam is mechanically compressed. The process raises its temperature as steam, and also raises the temperature at which it condenses to water. The temperature raise means that heat is given off. This heat is used to evaporate more of the water in the still. As long as the pressure is kept up, the process is continuous. Fuel is used to provide the mechanical pressure, but not to heat the water as in ordinary distillation.

Chemical means of getting drinkable water from the ocean were successfully used during the war in lifeboats and liferafts. One kit used contained silver alumino silicate in a treatment bag. When ocean water was added two insoluble compounds were formed. These were strained out by a cotton filter in the reaction bag.

The so-called ion-exchange process, used for many years in softening water in homes, is regarded as a possible method of freshening sea water. An ion is an atom with an electric charge upon it. In the ion-exchange process, harmless portions of an added substance are swapped for the unwanted impurities in the water. The process has other applications in addition to the purification of water.

Synthetic resins are sometimes used as ion-exchange materials. In the process the sodium ions of the salt of sea water are replaced by hydrogen ions. In another bed of ion-exchange material, the chloride ions of the salt are replaced by hydroxyl ions from the water. The result is that the salt in water is replaced by pure water, giving as a final result a demineralized water.

A mixture of synthetic resins, a recent discovery, permits both exchanges to take place at the same time without interference with each other. After use, the resins can be separated, regenerated, and then remixed for repeated use.

Refrigeration of sea water is another process seriously proposed. It has been a laboratory technique for some time. Nature also practices this scheme on a large scale. Ice floes in polar regions are pure water, it is claimed. A practical method for commercial use of freezing the salt out of sea water, however, has not yet been developed.

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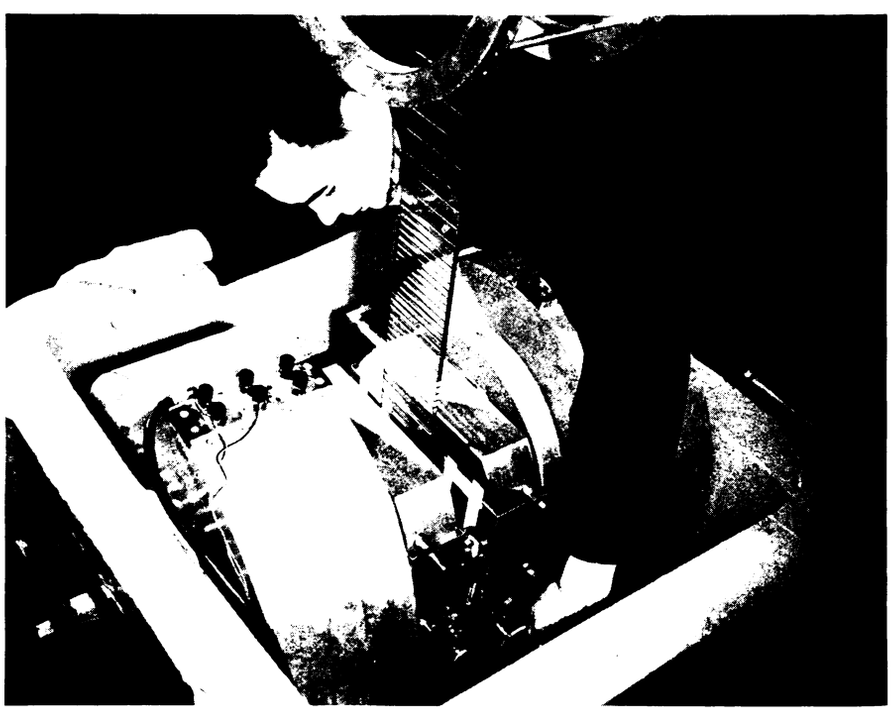
NUCLEAR PHYSICS

Basic Computations Made More Accurately

➤ TWO mathematical computations which are of basic importance in the whole field of atomic and nuclear physics have been recalculated with "unprecedented accuracy" by scientists at the National Bureau of Standards

The computations are: the absolute value of the magnetic moment of the proton; and the value of the basic constant e/m—electric charge to mass ratio of the electron. These provide needed fundamental knowledge about the atom for researchers working on the practical applications of atomic energy.

The computations give a standard for measuring magnetic fields, the possibility of a redetermination of all other physical



MAGNET ASSEMBLY—Dr. A. H. Thomas of the National Bureau of Standards is shown adjusting the position of a nuclear resonance detector to plot the strength of a magnetic field at various points. This is part of the apparatus used to recalculate two basic mathematical computations in the field of atomic physics.