

CHEMISTRY

Resins Purify Water

Sugar solutions, chemicals and pharmaceutical products are freed of inorganic salts by passing through ion-exchange synthetics.

► WATER is now freed of undesirable mineral salts by filtration through specially-prepared synthetic resins and purified to a degree where it is nearly equivalent to distilled water in quality, and may be used in place of distilled water in many chemical processes, declared Dr. Robert J. Myers, of the Resinous Products and Chemical Company, Philadelphia, in a lecture at Western Reserve University. Sugar solutions, chemicals, and pharmaceutical products may be purified of inorganic salts by the same method, he said.

This modern method of producing water and chemical solutions free of inorganic salts consists in passing them through two beds of the special resins known as ion-exchange resins. The ion-exchange synthetic resins are of two kinds, he explained, a cation-exchanging type and an anion-exchanging type. The first will exchange sodium for calcium and magnesium ions, the latter two being the hardness-producing ions in water supplies, and the water is thereby softened. When the store of sodium ions in the resins is exhausted, the calcium and magnesium ions which have been captured by the resin during the softening process are flushed off by the use of strong salt solutions and the rejuvenated resin is again ready for use.

"In a similar manner the same resins can be used as a storehouse of hydrogen ions," the speaker continued, "by treatment of the resin with a mineral acid, and the hardness-producing as well as the alkali-ions of water may be displaced by hydrogen ions."

Sodium bicarbonate alkalinity is converted to carbonic acid, and mineral salts, such as sodium sulfate, are converted to the free acids by the use of the hydrogen exchanger.

"The anion-exchanger resin is a similar gel-like substance which contains basic groups, such as amino, which bind mineral acids when placed into contact with acid solutions," Dr. Myers explained. "When the effluent from a hydrogen exchanger bed is passed through a bed of granulated, anion-exchanger resin, the free mineral acids generated in the first bed are bound by the second bed, and

water free of all mineral salts emerges from the second bed."

Such "de-ionized" water is nearly equivalent to distilled water in quality and can be produced at a fraction of the cost, he added.

Water, de-ionized by this process, is being used in the manufacture of synthetic rubber, pharmaceuticals, plastics in ceramics and metallurgy, he stated. Specific processes for the removal of dissolved salts from molasses, formaldehyde solutions, and sugar syrups, and other purposes, have been developed. Organic chemical synthesis, Dr. Myers said, has been combined with colloid chemistry in the development of the synthetic resin exchange adsorbents.

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Color Detectives Speed Chemical Analysis

► COLOR detectives that simplify and speed up the chemical analysis of such substances as milk, metals, beer, wine and soap have been perfected in stable form at the University of Illinois. The detectives are chemical reagents that have long been known in chemical laboratories, but because of difficulties involved in compounding them have not heretofore been looked upon as stable and positive tools of chemical analysis.

Chemically the reagents are known as ortho-phenanthrolines. They are so efficient that they are able to disclose the presence of one part of iron, or certain other elements, in a million parts of water. The new development at the university chemical laboratory is a process of producing the reagents as stable compounds capable of giving reliable reaction. Their use will permit an industrial chemist to make in 15 minutes a certain analysis that under old methods might take a half day.

Phenanthrolines have the property of combining with electrically charged atoms known as ions. Their affinity for metallic ions is so great, according to G. Frederick Smith of the University chemical staff, that three molecules of one of these compounds will combine with one



TRANSPORT LINE—From this typical well thousands of cubic feet of natural gas bearing helium have been removed for processing at the Amarillo plant. Completion of the 32-mile line from Exell, Texas, opens the way for utilizing the Cliffside field as a natural reservoir for storing helium not required immediately by the military and government agencies or by commercial and scientific users.

ion of iron, producing an intensely red water-soluble compound.

The reagent also has an affinity for copper, nickel, chromium, cobalt, zinc and other metals, and with it the presence of these metals in water, or in alloys, or in food products, can be detected.

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AERONAUTICS

Engine and Propeller Mounted Separately

► A NOVEL way of mounting airplane engine and propeller units is covered by patent 2,371,872, granted to Frank W. Caldwell and Erle Martin of West Hartford, Conn. By mounting engine and propeller separately, each in its own housing, and connecting them with a flexible shaft, two advantages are gained. Most of the troublesome vibration that occurs when engine and propeller are rigidly connected is eliminated; and it becomes possible to remove either engine or propeller for repairs or replacement without disturbing the other.

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