

## CHEMISTRY

# Nothing Makes Vitamins

High vacuums achievable by means of very efficient pumps make it possible to evaporate vitamins A and E out of oils without use of damaging heat.

➤ NOTHING is responsible for the present greatly increased supply of better and cheaper vitamins. Or if not exactly nothing, then as near to it as technological ingenuity has been able to contrive, and in very large quantities, at that.

The scientific sense behind this apparent paradox was explained before the Swarthmore College chapter of the Society of the Sigma Xi by Dr. Kenneth C. D. Hickman, vice president and director of research of Distillation Products, Inc., Rochester, N. Y.

The "nearly nothing in large quantities" is the very high vacuum achievable on a commercial-plant scale by means of exceedingly rapid and efficient pumps, usually operating in batteries. It is now possible to obtain exceedingly low atmospheric pressures within the large stills where vitamins A and E are evaporated out of the oils in which they occur in nature, and condense them in purified form, all without the application of heat that would damage or destroy them.

Although these pumps get nearly all the air out of any closed vessel, the resulting vacuum is nowhere nearly as perfect as that believed to obtain in interstellar space. Out there, there is on the average only one lonely molecule for every cubic meter of emptiness. In ordinary, sea-level air there are  $10^{19}$ ,

or 10,000,000,000,000,000, molecules in every cubic centimeter. The new pumps get the molecular count per cubic centimeter down to  $10^{13}$ , or 10,000,000,000,000—which is doing pretty well, as human contrivances go.

At this reduced atmospheric pressure, a molecule evaporating from a liquid surface within a still could travel a whole inch without bumping into an obstructing atmospheric molecule. In practical terms, this has meant the possibility of large-scale production of vitamins and their preparation in new and more potent compounds.

The patterns of the molecular stills used in the industry have become more complex, and their size progressively greater, as the capacity and efficiency of the pumps increased. To expose greater evaporating surfaces of oil, arrangements were first made to have it flow constantly in a falling film. Then, to speed the flow, rotating plates were introduced, which adds centrifugal force to the pull of gravity.

The most complicated still in present use, Dr. Hickman said, "consists of a centrifugal evaporator over which some hundreds of pounds of oil may be spun each hour, housed in a vacuum kettle rather like an Indian wigwam, and evacuated by a train of pumps two stories high."

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## STATISTICS

## More U. S. Deaths

But the 1943 upturn in mortality rate due to the war is reported as "not at all severe." Average length of life decreased to 63.8 years.

➤ THE UPTURN in national mortality due to the war, as seen in the death rate among industrial policyholders for the year 1943, is "not at all severe," statisticians of the Metropolitan Life Insurance Company report.

The rate for that year, 782 per 100,000 policyholders, is still less than for any year prior to 1938 and is only 3.9%

above the average of the last five years.

For the nation as a whole the 1943 death rate is estimated at 10.9 per 1,000 population, as compared with 10.4 in 1942, an increase of about 5%.

The sharpest rise in the death rate among the policyholders occurred at ages 20 to 24 among white males. This was up 84% over 1942 and 144% over 1941.

Among women of military age the death rate in 1943 was lower than in 1942.

The higher mortality also caused a decline in the average length of life of industrial policyholders to 63.8 years, or three-tenths of a year less than in 1942.

A major factor in the increase in mortality in 1943 was the sharp rise in deaths attributed directly to the war, deaths through enemy action, deaths in prison camps, and deaths from accidental injury among military personnel.

Apart from war deaths, the largest increase in mortality in 1943 was due to influenza and pneumonia, the Metropolitan report states. At that, the death rate from influenza and pneumonia combined in 1943 was only 25% above the minimal rate recorded in 1942 and only one-half the annual average of about 82 per 100,000 for the five years prior to development of serum treatment and chemotherapy. Another heartening comparison is between the 1943 influenza-pneumonia death rate of 41.3 per 100,000 and the 1918 average for the year of 542.2 per 100,000.

Deaths from heart, kidney and blood vessel diseases increased, in association with the rise in influenza and pneumonia. Measles, whooping cough, diphtheria, diarrhea and enteritis and meningitis also showed slight increases in 1943.

On the favorable side of the picture, tuberculosis, syphilis, appendicitis and diseases associated with childbirth recorded new minimum death rates in 1943.

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## INVENTION

## Mower to Cut Weeds Uses Whirling Chains

➤ A NOVELTY MOWER, on which patent No. 2,341,486 was granted to H. C. Swertfeger of Jarrett, Va., is not intended for making hay, but rather for weed destruction along highways and in other places where stumps, stones and other obstructions make the use of an ordinary cutter-bar machine impossible.

On a rotating cylinder, powered with a takeoff from the tractor engine, short pieces of chain are fastened, their lengths graduated to form an over-all spiral pattern. When the cylinder spins, centrifugal force causes the chains to whirl, and they lash to shreds any weed they encounter. But if they strike stump or stone they simply glance off, neither breaking nor stalling the machine.

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