CHEMISTRY

New Nitric Oxide Process

Efficient, simple and inexpensive method developed in the laboratories of the University of Wisconsin. Will replace other production methods.

➤ NITRIC OXIDE, essential chemical in the manufacture of nitrate fertilizers and explosives, can now be made by an efficient, simple and inexpensive method developed in the chemical laboratories of the University of Wisconsin. It promises to replace the electric-arc and the German Haber methods of nitrate production, both of which are expensive and require extensive capital investments.

The new nitrogen fixation process was developed under the direction of Prof. Farrington Daniels from 1939 until 1944, then by William G. Hendrickson in Prof. Daniels' absence. The fundamental theoretic concept was proposed first by Dr. F. G. Cottrell of the Research Corporation. Patent applications have been made by the Wisconsin Alumni Research Foundation, a non-profit organization.

As is well known, air is made up principally of mixed but chemically uncombined nitrogen and oxygen. To combine them chemically to form nitric oxide, a temperature of 4,200 degrees Fahrenheit must be reached, and to make them stay combined the nitric oxide formed must be cooled almost instantaneously to at least 2,800 degrees.

In the electric-arc process, in which the extreme temperature is reached, air is passed through a high-voltage current leaping across the gap between two electrodes. In the Haber process, developed in Germany, ammonia is used as the go-between for the production of nitric oxide. Both processes are costly and for both extensive and expensive plants are required.

The new Wisconsin process appears deceptively simple. It consists of blowing large quantities of air through a hot bed of refractory pebbles to pre-heat the air, then through an extremely hot gas-fired furnace, and finally through a second pebble bed where the gas is chilled very rapidly and the heat is released and stored for use in pre-heating the incoming air when the flow is reversed.

"In effect, the plant is a two-way gas furnace," Mr. Hendrickson explains. "It was previously impossible to get this extremely high temperature because the flame temperature of fuel gases burning in ordinary air is much less than 4,200 degrees.

By pre-heating the air in a pebble bed, the flame temperature rose to 4,200 degrees, he said, "and at the same time two other objectives were accomplished—one bed of the furnace was cooled and the opposite one heated, so by periodically reversing the stream of air we could heat the nitrogen and oxygen to the temperature at which they would combine and almost immediately chill the resulting nitric oxide to prevent decomposition."

Science News Letter, December 29, 1945

PLANT PATHOLOGY

Pineapples Flower Full Year Ahead of Time

➤ PINEAPPLES have been induced to flower a full year ahead of their normal blossoming time by applications of growth-promoting chemicals, sometimes called synthetic hormones, in experiments at the Institute of Tropical Agriculture. Results are reported briefly by Dr. J. van Overbeek (*Science*, Dec. 14).

The chemical used in most of the experiments was naphthaleneacetic acid, called "NA" for convenience. Also used was 2,4-dichlorophenoxyacetic acid, which has recently received considerable public notice as a weed-killer under its convenience-designation, 2,4-D. In the pineapple-stimulating experiments, however, the concentrations were kept far below those used for weed eradication. The chemical was used in a dilution of five parts per million of water, and about a wineglassful of the solution applied to each plant. This concentration is only about one per cent as strong as that needed for killing weeds.

"The following conclusions," states Dr. van Overbeek, "may be drawn from these observations:

"One ounce of either NA or 2,4-D is a sufficient amount for inducing flowering in 113,000 plants, which is equivalent to a pineapple plantation of 11 acres.

"One dollar's worth of chemical (2,4-D, at the current price of $7.50 per kg) will treat over one-half million of plants (536,000), the equivalent of 53 acres of pineapples."

Science News Letter, December 29, 1945