Vitamin C and Ascorbic Acid

MESSRS. Birch, Harris, Ray and Dann have summed up in NATURE of February 25 (p. 273) the arguments for believing that vitamin C and hexuronic (ascorbic) acid are identical. In the course of their observations they refer to "Ostermalt" as having been shown by their chemical method to contain an amount of ascorbic acid that should cause it to protect guinea-pigs from scurvy in a daily dose of 3·3 gm.; no figure was apparently available to the authors enabling them to compare this conclusion with an actual biological assay.

In further substantiation of the authors' views that ascorbic acid and vitamin C are identical, I may be permitted to state that Ostomalt, to which they presumably refer, as manufactured in these Laboratories for the last six years, contains a proportion of concentrated Californian orange juice? The amount of this juice present in Ostomalt is such as to give the equivalent of half its own volume of fresh orange juice to the product. 3·3 gm. of Ostomalt occupy a volume of about 2·5 ml., and the figures given by Birch, Harris and Ray for the protective dose of orange juice are 1·2, 1·5, 1·9 ml. It will therefore be seen that the results obtained by their titration method are in good agreement with the equivalent of fresh orange juice present in the product.

A short while ago an independent laboratory, carrying out tests for an official body, found by biological assay that Ostomalt contained an amount of vitamin C that was "in very fair agreement with their [the manufacturers'] claim that the product contained antiscorbutic vitamin equivalent to half its volume of fresh orange juice".

It would therefore seem that the chemical estimation of the vitamin C present in this product, which is primarily a mixture of malt solids, concentrated orange juice, and cane sugar, with certain other vitamin supplements, is in substantial agreement with direct and indirect biological assays, affording further confirmation for the views of Birch, Harris, and Ray as to the identity of vitamin C and ascorbic acid.

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An Inhibitor of the Antimony Trichloride Test for Vitamin A in Cod Liver Oil.

IT has been shown[1] that traces of substances like furan, indol and skatol inhibit strongly the intensity of the absorption band of vitamin A with antimony trichloride at 620 mμ. In cod liver oil, there must be such an inhibitor, because after saponification a much stronger Carr and Price reaction is obtained with the unsaponifiable fraction.

Attempts to isolate this inhibitor by means of different soaps in various solvents; vacuum distillation; bromination and debromination; and cooling down to low temperature in different solvents, proved to be unsuccessful. However, I have succeeded in isolating it in the following way: Cod liver oil for medical purposes (pale yellow coloured) is saponified, acidified and the mixture of acids dissolved in five volumes of petroleum ether (b.p. 60°–80°). After drying with anhydrous sodium sulphate the solution is vigorously shaken up with 1/10 volume of diluted sulphuric acid (5 volumes of 96 per cent sulphuric acid + 2 volumes of water). The sulphuric acid layer contains the inhibitor and is poured out into a large volume of cold, saturated sodium sulphate solution. This mixture is extracted several times with petroleum ether. After evaporation of the solvent, the resulting oil is distilled and boils at 180°–210°/1–2 mm. This oil is dissolved in petroleum ether and again shaken out with sulphuric acid. The resulting oil, a pale yellow viscous substance, boiled at 203°/1 mm. From 1 litre of cod liver oil about 2½ c.c. was obtained.

The inhibiting power (measured by means of a Zeiss stuphometer with the *S* 61 filter) is four to five times as large as that of indol. The substance readily absorbs bromine and gives a strong orange yellow colour with tetranitromethane. The iodine value (Wijs) and bromine value (Kaufmann) depend on the time of reaction and excess of the reagent. Iodine values varied from 205 to 392, and bromine values from 166 to 364.

Molecular weight determination gave 332 (titrated as a mono-basic acid). Analysis gave as a formula $C_{21}H_{36}O_3$. Qualitative tests for sulphur and nitrogen (Lassaigne) were negative. Catalytic hydrogenation (platinum catalyst) showed absorption of about 4 atoms of hydrogen per molecule. The hydrogenated product has lost the inhibiting power, and gives no colour with tetranitromethane (bromine value after 5 minutes reaction = 0).

However, it may also be pointed out that the inhibiting power of a substance is not due to its unsaturation alone, because specially prepared, very pure, unsaturated fatty acids (oleic, linoleic acid) do not show any inhibiting power. Impure fatty acids (oxidised) give a red Carr and Price reaction; thus in presence of vitamin A there results a mixed colour, but no inhibition will be seen by spectroscopical research.

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[1] NATURE, 128, 495, Sept. 19, 1931.

Dissociation of Nitrous Oxide in the Glow Discharge

IN a recent paper, Kueck and Brewer[1] describe experiments made on the dissociation of nitrous oxide in the 'glow' discharge. Using a special disposition of electrodes which eliminates anode glow and positive column, they find, with fields of the order of 2,000 volts/cm., over a pressure range 2–5 mm., that the initial decomposition rate is practically independent of the initial pressure. Similar results for both nitrous oxide and ammonia have been described by Hinshelwood and Hutchinson[2], who, using a method which gives essentially the integrated dissociation throughout all parts of a normal glow discharge, state that for weak discharges the absolute amount of decomposition tends to be independent of the initial pressure. They observe, however, that for more intense discharges "the amount of decomposition becomes proportional to the pressure, i.e., the percentage decomposition is now independent of the initial pressure". This they term the "unimolecular state". Unfortunately, they give little data as to the potentials employed.