British Chemical Plant Exhibition.

THIS Exhibition, held by the British Chemical Plant Manufacturers' Association concurrently and at the same place as the Chemical Engineering Congress, was opened by the Rt. Hon. Mr. Ramsay Macdonald on Monday, the 22nd June, at the Central Hall, Westminster.

Mr. Monnypenny, the Chairman of the Association, said that, that Exhibition, the third of its kind—the other two having been held in 1926 and in 1931—showed what a great progress the British manufactures of chemical plant had made in this direction in the post-War years. In order to qualify as British, at least 75% of the cost of production—including material and labour—of the plant must be British or of Empire origin. He laid emphasis on the closer co-operation between the chemical manufacturer and the chemical plant manufacturer and said that, so far as he knew, the confidence of the former had not in a single case been betrayed by the latter.

Mr. Ramsay Macdonald, in declaring the Exhibition open, said that he was greatly impressed by the achievements of British chemical engineering one of the notable examples of which he saw in the plant for the conversion of coal into oil at Billingham. The aim of the Department of Scientific and Industrial Research with which he is connected *ex officio* as Lord President of the Council is to promote co-operation and interchange of ideas between the chemist, the physicist and the engineer.

Later, an inaugural lunch was held at the Hotel Victoria and was attended by a very large number of members of the Congress and guests. In proposing the toast of the British Chemical Plant Manufacturers' Association, Sir David Milne Watson, who is himself connected with a large chemical industry, *viz.*, the gas industry, laid emphasis on the need and value of making one's products known to the users by what was at one time known as propaganda but now goes under the name of "communication". Mr. Ramsay Macdonald in his speech expressed the hope that there would be closer co-operation between Great Britain, Germany and the United States in this field.

The Exhibition illustrated the wide range of apparatus and plant that is now available in Great Britain, not only for the chemical industries but also for the numerous others which utilise similar equipment. On its stands could be seen and examined the latest advances in chemical plant together with the host of appliances and equipment that are required to meet the demands of modern industry. In addition to the apparatus required for processes such as evaporation, distillation, drying, feeding, screening, sifting, etc., plants designed for filtering, pumping, separating, clarifying, emulsifying, etc., were also on view.

The stainless steels—called 'special' steels on account of their resistance to heat, rust, acids—were shown by their respective makers. The plant manufacturers have made them 'general' by their utilisation in the fabrication of equipment where contamination is undesirable. Of note amongst the corrosion resistant plant which included aluminium, etc., mention may be made of glass-lined equipment—which is, so to speak, the works counterpart of laboratory glassware—vitreous enamelled receptacles and the new white stone ware.

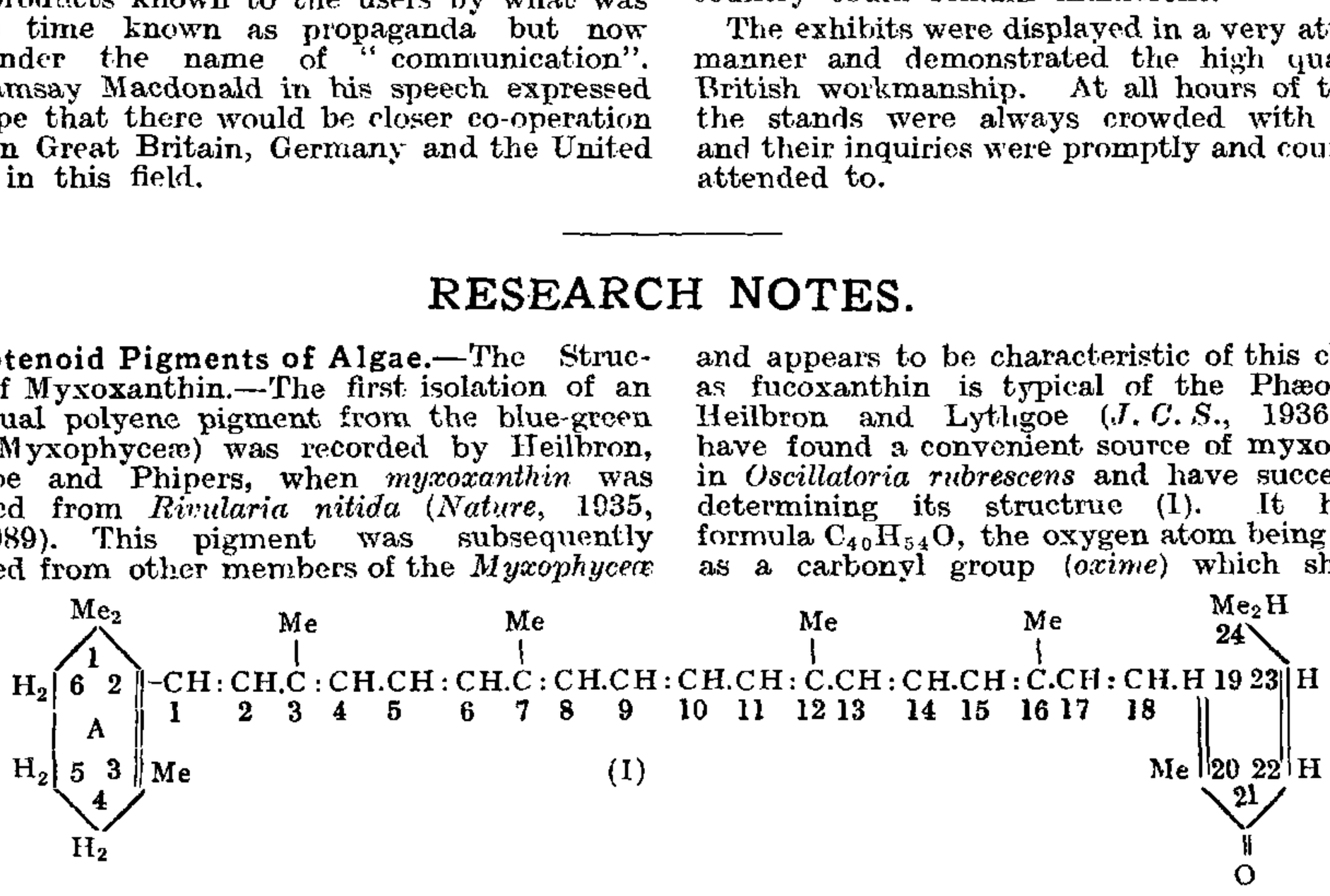
Instruments for the indication, control and recording of temperatures, pressures, humidities, hydrogen ion concentration, meters for various uses, pyrometers and many other essential means for the control of industrial operations were displayed in quantity.

The Industrial Research Exhibit—a very large stand organised by the Department of Scientific and Industrial Research—was very interesting and instructive. It was designed to show how this department aids British industry by applying the results of scientific research to its problems—a subject to which no progressive country could remain indifferent.

The exhibits were displayed in a very attractive manner and demonstrated the high quality of British workmanship. At all hours of the day, the stands were always crowded with visitors and their inquiries were promptly and courteously attended to.

RESEARCH NOTES.

Carotenoid Pigments of Algae.—The Structure of Myxoxanthin.—The first isolation of an individual polyene pigment from the blue-green algæ (Myxophyceæ) was recorded by Heilbron, Lythgoe and Phipers, when *myxoxanthin* was obtained from *Rivularia nitida* (*Nature*, 1935, **136**, 989). This pigment was subsequently obtained from other members of the *Myxophyceæ* and appears to be characteristic of this class just as fucoxanthin is typical of the Phæophyceæ. Heilbron and Lythgoe (*J. C. S.*, 1936, 1376) have found a convenient source of myxoxanthin in *Oscillatoria rubrescens* and have succeeded in determining its structrue (I). It has the formula $C_{40}H_{54}O$, the oxygen atom being present as a carbonyl group (*oxime*) which shows no



(I)

tendency to enolise. Quantitative microhydrogenation in decalin-acetic acid of the pigment and its oxime indicates the presence of 12 ethenoid linkages. It follows that myxoxanthin is monocyclic and is to be classed with γ-carotene and rubixanthin. Like γ-carotene, it contains an unsubstituted β-ionone ring since biological experiments with vitamin-A-starved rats show that it possesses growth-promoting properties. That the carbonyl group is conjugated with the polyene chain is shown both by the colour difference between solutions of the same concentration in light petroleum (yellow) and in alcohol (pink), and also by comparative spectrographic examination of myxoxanthin and its oxime. Reduction of myxoxanthin by aluminium *iso*propoxide gives the alcohol myxoxanthol, which is spectroscopically identical with both γ-carotene and rubixanthin. Myxoxanthol therefore possesses a chromophoric grouping of one cyclic and 10 acyclic ethenoid linkages in unbroken conjugation, and consequently in myxoxanthin a carbonyl group must be situated at C_{21} in a γ-carotene skeleton, the only possible alternative (at C_4, ring A) being excluded by the biological activity of the pigment. The unlocated ethenoid linkage may be $\Delta^{22\text{-}23}$ or $\Delta^{23\text{-}24}$, either position being compatible with the observed optical inactivity of myxoxanthin. A decision in favour of $\Delta^{22\text{-}23}$ has been reached by a comparison of the results of spectroscopic examination of myxoxanthin and of carotenoid pigments of known constitution. Characteristic of the class to which myxoxanthin belongs, is a single broad band as contrasted with the normal triplet spectrum of carotenoids having a carbonyl group terminating the chromophoric system. The conclusion is reached that the single-banded spectrum of such pigments is due to the simultaneous conjugation of the polar carbonyl group with two sets of unsaturated linkages.

Heilbron and Lythgoe have also isolated from *Oscillatoria rubrescens* a new pigment *myxoxanthophyll*, $C_{40}H_{56}O_7$ ($\pm$ 2 H), but in insufficient quantity to determine the structure. The tenacity with which it is retained by adsorbents indicated the presence of a multiplicity of hydroxyl groups. The absence of polar groups conjugated with the polyene system is suggested by the fact that the alcoholic solutions are coloured only yellow to orange red.

T. S. W.

Ultrafiltration by a Centrifuge Method.—The ineffectiveness of ultrafiltration technique in concentration of colloids is principally due to clogging of the ultrafilter membrane by a deposit of the disperse phase; this reduces the filtration velocity very much or even stops it altogether. Since even a thin deposit of the disperse phase is often quite effective in bringing down the rate of filtration, the incorporation of stirring or scraping devices does not help very much. Brinkman and Steinfoorn (*Biochem. J.*, 1936, **8**, 1523) have eliminated this difficulty by an ingenious device. The liquid to be ultrafiltered is kept in a small cylindrical unglazed porcelain pot coated with an ultrafilter membrane and centrifuged. The centrifugal force not only provides the necessary pressure for ultrafiltration but is also helpful in another way. Any peripheral part of the liquid which gets concentrated and hence increased in specific gravity is centrifuged towards the bottom and thus clogging is prevented. As the experiments show, comparatively large quantities of the ultrafiltrate are obtainable by this method.

K. S. G. D.

The Neutrality of the Neutron.—Chadwick's original proof that neutrons are unaffected by electric field were really made with fast neutrons. P. B. Moon (*Proc. Phys. Soc.*, 1936, **48**, 658) has carried out experiments with slow neutrons having thermal energies. The results show that the neutron possesses, if at all, an amount of charge much less than 10^{-7} times that of an electron.

K. S. G. D.

Routine Determination of Boron in Glass.—Francis W. Glaze and A. N. Finn in a recent paper (*J. Res. National Bureau of Standards*, **1936, 16**, No. 5) describe the procedure adopted and the results obtained by a new method for determination of boric acid in specimens of glass. The method depends on the "partition" of boric acid between water and ether in the presence of ethanol and hydrochloric acid. The partition coefficient can be calculated roughly from the relation $K = 0.673 - 0.054\sqrt{t}$ and is equal to 0.403 at 25 $\pm$ 2°. The boric acid in the ether layer is estimated volumetrically by titration with standard alkali.

A study was made of the extent to which the other elements present in glass interfered with the method. It was found that the usual amounts of lime, magnesia, alumina, soda, iron and arsenic did not interfere, but barium, fluorine and large amounts of iron interfered slightly. Zinc, however, was found to interfere seriously.

Amounts of boric oxide ranging from 0.7 to 16 per cent. could be estimated rapidly and accurately by this method.

K. R. K.

Absorption of X-Ray by Lead Glasses and Lead Barium Glasses.—By George Singer (*J. of Res. of the National Bureau of Standards*, March 1936, **16**, 3\).—The object of this study was to determine the X-ray protective properties of flint and barium-flint glasses and to correlate them with their chemical composition as well as with their physical properties such as density and refractive index.

Adequate details are given of the experimental arrangement and procedure adopted.

The X-ray opacities of the materials were determined by an ionisation method. That thickness of lead which gave the same ionisation current as the sample was taken as its lead equivalent.

The results obtained enabled the formulation of several empirical relationships. In the case of flint glass, its protection coefficient was correlated to (*a*) density, (*b*) refractive index and (*c*) chemical composition, thus enabling the protection coefficient of a sample to be predicted from a knowledge of its density, refractive index or chemical composition. The values calculated from these formulæ were found to be in good agreement with the results of experiment.

In the case of barium-flint glass, an empirical relation is given between the protection coefficient and the lead oxide and barium oxide components of the glass.

K. R. K.