calcium nickel phosphate stabilized with chromium oxide. Conversions of butenes to butadiene of 30–50 per cent can be obtained with a selectivity of approximately 90 per cent. Other catalysts, for example, one containing ferric oxide, chromium oxide and potassium oxide, are less selective at higher conversions, but require a lower steam dilution ratio and have longer life.

The direct dehydrogenation of *n*-butane to butadiene is being used at five of the more recent butadiene plants. A particular advantage of this process, employing a catalyst of activated alumina with 18–20 per cent of chromic oxide, is that it can be used to make butadiene or a mixture of butadiene and butenes. The present position in Europe is such that supplies of butenes from refinery catalytic cracking are inadequate, and emphasis has been placed, for example, in Germany, on butane dehydrogenation; the European figures for butadiene (18 per cent from butenes, 22 per cent from *n*-butane, 38 per cent from steam cracking of light naphtha and 22 per cent from acetylene), are quite different from the corresponding figures from the United States (48, 41, 11 and 0 per cent, respectively). The heavy European dependence on steam cracking is associated with the considerable ethylene production capacity based on this route, and this position is unlikely to change for some time, although additional butadiene plants will need to be built to cope with the demand for SBR rubber.

Despite its versatility as a chemical, butadiene is too expensive an olefine compared with ethylene or propylene to find major outlet in anything but the polymer field; even acetylene is slightly less expensive. In the United States, 85 per cent of the butadiene is used in the manufacture of SBR rubber, with much smaller amounts (each 2 per cent) in the oil-resistant butadiene-acrylonitrile synthetic rubber,

and in production of adiponitrile for nylon. Greatest growth-rate is offered by the polybutadiene rubber process, one involving stereospecific polymerization by Ziegler catalysts to a predominantly *cis* 1,4-structure; this elastomer approaches natural rubber in properties although, unlike *cis* 1,4-polyisoprene, it must be used admixed with natural rubber.

The final symposium paper, "Newer Developments in the Polymerization of Olefines", was delivered by Prof. C. E. H. Bawn, with Prof. G. Gee in the chair. Prof. Bawn showed how a difficult, controversial and rapidly developing field of study, initiated by the now-classical work of Ziegler and Natta, could be summarized and presented in a clear and logical manner. The scientific significance and the commercial importance of the catalytic methods for the production of new classes of sterically regular polymers are apparent to everyone; seldom has one discovery had so rapid and enormous an impact on an industry. After surveying the Ziegler-type catalysts and the catalysts of the supported metal oxide type for the low-pressure polymerization of ethylene and other olefines, Prof. Bawn went on to discuss in masterly style the structures of the olefine and diene polymers and their properties. This paper brought to a close a most successful symposium.

Interest in all the papers was high, and the audience had an appreciable number of questions to ask. Drs. H. Kaye, P. J. King and C. A. Curtis are to be congratulated on their organization; even Manchester provided blue skies for the occasion. The papers and discussion, which will appear in the *Journal of the Institute of Petroleum*, provide useful reading for all chemists and chemical engineers, since interest in the lower olefines extends far beyond the petroleum or petrochemicals industry. These compounds are the key building blocks of modern industrial organic chemistry.

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THE NATIONAL INSTITUTE OF GENETICS, JAPAN

IN 1949 the Institute of Genetics was set up in Japan to cover practically the whole range of this discipline. There are six departments devoted to: morphological genetics, cytogenetics, physiological genetics, biochemical genetics, applied genetics, and induced mutation. In addition to these, the Rockefeller Foundation supports two groups of workers, one in special rice studies, and the other on the effects of radiation in animals.

Fifty-one research projects are being pursued in the six departments*. These range from virus, through insects (silkworms and *drosophila*) and plants to mammalia. They include such diverse topics as the cytology and genetics of tumours to studies of right- and left-handedness in plants. Radiation studies play a large part throughout the programme.

Many contributions deserve extended notice, though space will permit casual reference to only one or two of them.

An interesting paper is on the subject of a silkworm poison emanating from tobacco plants. It has long been known that when silkworm larvae are fed

on leaves taken from mulberry trees near a field of tobacco they are often poisoned. Tsujita and his co-workers now show that the poisonous substance is nicotine, which is present in mulberry leaves to the amount of 1–10 mgm. per kgm. When mulberry leaves were painted with diluted nicotine solutions of this order of concentration, silkworm larvae showed similar symptoms of poisoning to those observed in the field. It is believed that nicotine molecules emanate from the tobacco plant secretions or from the disintegrating cells of the leaf hairs.

Cereal workers will note with interest the work of Oka and Sakai on the mode of inheritance of competitive ability in rice. They show that the competitive ability of a strain is determined genetically, and can be analysed by the same method as used for ordinary quantitative characters.

Differences in radiosensitivity and radiomutability between cultivated and wild strains of the Japanese morning glory were investigated by Kihara and Sakamoto. They report that both radiosensitivity and radiomutability of the cultivated strains was higher than in the wild one.

The number of papers published by the staff of the Institute was 108 in 1958, and 65 in 1957.

S. C. HARLAND

* National Institute of Genetics, Japan. Annual Report, No. 9, 1958. Pp. v+144. (Misima, Sizuoka-ken: National Institute of Genetics, 1959.)