

the growth of civilisation with the development of archaeological investigation in the Far East.

It is something of a work of supererogation to commend a volume such as this which surveys the work of an expedition already widely recognised as having made a vast contribution to scientific knowledge. It is, however, at once a duty and a pleasure to say that Dr. Andrews and his collaborators have accomplished what they set out to do. They have made for the benefit of the scientific world and the general public a lasting record of a great undertaking which has produced epoch-making results.

Science in the Petroleum Industry

The Scientific Principles of Petroleum Technology.

By Dr. Leo Gurwitsch and Harold Moore. New edition. Pp. xii+572+9 plates. (London: Chapman and Hall, Ltd., 1932.) 30s. net.

FEW industries have expanded more rapidly than that of petroleum. The enormous demand for motor spirit has brought about both an increased production of crude oil and an overhaul of the methods of distillation and refining, including cracking and hydrogenation, so as to produce a petrol of high quality suitable for use in the automobile of to-day. Whilst there has been much progress on the mechanical side, including the design of stills, of cracking plant and of apparatus for the storage and transport of very large quantities of oil and gas, there has also been a great deal achieved on the chemical side of petroleum technology. The numerous members of the four classes of hydrocarbons—saturated, unsaturated, aromatic and naphthenic, are found in varying proportions according to the origin of a petroleum: they can be separated by rational treatment with various chemicals and by systematic fractional distillation. Such preparations are laborious and research in the main is directed to the separation of the four principal classes, as it is on the proportions of these that the value of a petroleum for a particular purpose depends. Thus Pennsylvania and Galicia oils are rich in saturated hydrocarbons, the Baku oils contain naphthenes, Borneo crudes are rich in aromatics—indeed at one time toluene was extracted from them.

This is a second edition, the first being a translation by Harold Moore of a German work by Prof. Gurwitsch. Owing to the death of the German

author the new edition is entirely the work of Harold Moore; in extending the book he has now paid special attention to the American developments.

The method adopted is to deal first with the chemistry and then the physics of the raw material, secondly with the manufacture from crude under the headings preliminary treatment, distillation, refining, and thirdly with the products.

It is of advantage to have a book of this kind in which the scientific practice and principles are separated from the oil-field technique with its particular jargon. The subject is fully and clearly treated in the chemical and physical sections, which are provided with copious references to the original literature. Technicians will perhaps find greater interest in the manufacturing section, where there is much which is stimulative and thought provoking, as for example, the sections on chemical processes in distillation and destructive distillation and on pyrolysis.

Oil cracking is a little industry of its own. It was at first brutal in its efforts to achieve any kind of cracking of a crude oil to products of lower boiling point. Now that the process is better understood and has been brought much more under control, it is possible to effect the simplification of the large molecules into smaller ones without creating undue quantities of coke or gas representing small fragments of the molecule. Indeed the latest processes of high-pressure cracking are so efficient that upwards of eighty per cent of merchantable petrol is obtained from a suitable crude.

The competitive market requires a high, though often purely arbitrary, standard of quality in petrol, so that refining has become an important operation. It affects colour, specific gravity, flash point and viscosity. Among chemical methods one of the most interesting is that of Edeleanu, which makes use of liquid sulphur dioxide as a solvent for aromatic and unsaturated hydrocarbons, and thus effects a partial separation of these from the naphthenes and saturated hydrocarbons.

Sufficient has been said to indicate the wide and ample scope of the work. The oil industry is not standing still, the present intensive competition being a spur to the utilisation of a crude oil to the last per cent. This can only be achieved by the application of science to every operation in the chain of production, manufacture, transport and distribution.

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