

Obituary

PROF. FRITZ HABER

BY Fritz Haber's death, chemistry loses one of its outstanding personalities. He was one of the greatest of academic chemists, of industrial chemists, and of leaders of research, while in his combination of these three rôles he was unique; at the same time he remained the most unaffected and kindest of men.

Haber was born in Breslau on December 9, 1868. His early education as a chemist was unusual, and indeed, as he would often say, he was as nearly as possible a self-made man of science. He attended courses in Berlin, Heidelberg, Charlottenburg, Zurich and Jena; he worked under Hofmann, Helmholtz, Liebermann (with whom he published his first paper on some derivatives of piperonal), Lunge and Ludwig Knorr, yet he never obtained from their courses the satisfaction which he desired. As a young man he spent some months in various industrial works; he was even for a time in his father's office before he returned finally to science. When he was twenty-six years old, he obtained a post as assistant to Bunte in the Institute of Chemical Technology at Karlsruhe, where his real work began, and where he remained for seventeen years.

At Karlsruhe, Carl Engler and Bunte encouraged him to develop his own school of research. Though Haber had received no formal instruction in physical chemistry, it was in this field that his main interests lay, and in a few years papers were appearing under his name on the combustion of hydrocarbons, the water-gas equilibrium in the Bunsen flame, and aspects of textile chemistry; but above all his main interests lay in the field of electro-chemistry. His classical studies on electrolytic oxidation and reduction belong to this period; these began with his demonstration of the stages of the reduction of nitrobenzene (1898). This was followed by work on the electrolysis of solid salts (1904), on the glass electrode, on the velocities of electrode processes (1902-8) and on gas and carbon cells, all work showing him at the height of his powers. Throughout the same time he was also engaged on his classical work "Thermodynamics of Technical Gas Reactions" (1905). His laboratory was filled with students from all parts of the world; unhampered by administrative cares, it was the most productive phase of his career.

To this period also belongs the beginning of Haber's work on the synthesis of ammonia from its elements, work which led to the discovery of one of the most important of all industrial processes. His first paper on the equilibrium constants of this reaction appeared with Van Ordt in 1904, and in 1906, with Le Rossignol, he undertook a repetition of the measurements, over a much wider range of temperature and pressure. It was then apparent that a catalyst which would operate satisfactorily at 600° C. would make this process

possible industrially, and to a man of Haber's breadth of vision the significance of the fact must have been immediately obvious. An unremitting search was made for such a catalyst, and uranium and osmium were found to be effective. A small technical high-pressure apparatus was constructed, and in June of 1908 two directors of the Badische Anilin- und Soda-Fabrik were invited to Karlsruhe to witness the first demonstration of the model at work. After an initial failure, liquid ammonia was produced, and a process of enormous importance to Germany and to the world was launched. Bosch and Mittasch undertook the task of converting the model into a full-scale plant, and with the constant shrewd co-operation of Haber the process was ultimately brought to the highest pitch of efficiency. Haber received the 1918 Nobel prize for chemistry for this work.

In 1906, at the age of thirty-eight years, Haber succeeded to Engler's chair, but left five years later to undertake the direction of the newly founded Kaiser Wilhelm Institut für physikalische Chemie und Elektrochemie at Berlin-Dahlem. Under his guidance this became the greatest research institution of its kind in the world; groups of research workers were left with the fullest freedom to develop their own ideas, while Haber gathered around him a devoted and talented staff whom he provided with every material and moral facility for the unhindered progress of their work. No man ever had a more devoted band of colleagues, and no man ever spoke of them more appreciatively than he did.

Haber's interest in the applications of the newer physics to chemistry was reflected in many papers at this time. His work with Just, on the emission of electrons during chemical reaction, had been published from Karlsruhe; and after the War he continued in the same vein with his pioneer work on the physical meaning of chemi-luminescence, and on the applications of the methods of spectroscopy to the analysis of the processes of combustion.

At the outbreak of the War, Haber was impressed by Germany's need for expert organisation of all her industrial resources. He offered his services to the Prussian War Ministry, where he was soon installed as head of the Chemical Warfare Department. There he worked unremittingly throughout the War. His advice and personal service were constantly in demand from all quarters, and such were his unrivalled knowledge and sanity of judgment that his name at this period became almost legendary throughout the country. He never sought to disclaim the responsibility for the use of poison gas, which was indeed the direct concern of his Department, but it should be remembered that latterly he gave up much of his time to serving on the League of Nations Committee on Chemical Warfare.

The War years left him with shattered health,

faced with the difficulties of reorganising an institution the funds of which were already dwindling owing to the monetary inflation, but with the secure conviction that only by the encouragement of research could German industry hope to regain its former position in the world. He played a leading part in the foundation of the *Notgemeinschaft der deutschen Wissenschaft*, and though some of his plans for the expansion of the Kaiser Wilhelm Institut had to be abandoned, it was not long before it was again in the forefront of research organisations. Meanwhile he himself was organising an attempt to pay the German War debt in gold won from sea-water, an attempt which failed yet yielded scientific results of importance.

The last years at Dahlem brought cares in plenty, but Haber's many industrial and administrative troubles were never allowed to interfere with the output of research from his private laboratory. The greater part of his work now was concerned with chain reactions and the mechanism of oxidation; perhaps his early association with Engler was responsible for this, and on this subject he worked with his assistants until the time of his death. He remained what he had always been, the ideal director of research, approachable, interested in everything, but above all the leader of the work of his Institute. His health was bad, but his industry enormous. Two honours he much appreciated were his election as an honorary fellow of the Chemical Society in 1931; and the award of the Rumford medal of the Royal Society in 1932.

The political situation in the spring of 1933 led to Haber's resignation. Almost all his staff and pupils were forced to look elsewhere for opportunities to continue their work, and he gave up his post rather than remain at Dahlem without them, in a country the political temper of which was so foreign to his own liberality of outlook. He spent himself unsparingly in helping his assistants and colleagues to find opportunities for continuing their work, and ultimately himself accepted an invitation of laboratory hospitality at Cambridge. He went to Cambridge in October and remained there to within a few days of his death. He had left for a short holiday on account of his health, intending to return to reside permanently at that University; but he died during the journey, at Basle, on January 29, 1934.

Haber was equally outstanding as a man and as a chemist. His amazing knowledge of politics, history and economics, as well as of science and industry, and his superb gift of expression made him a fascinating conversationalist. It was always a joy to hear him tell a story, whether it was an anecdote of the War or one of his famous medieval romances. After a paper or a colloquium he showed his powers at their fullest. Never at a loss, whatever the subject, he would always open the discussion with some characteristic contribution of his own, in a way which showed his

complete grasp of the subject. One of his outstanding characteristics was his pride in his work; the final preparation of a paper was a work of infinite labour, but once it was completed he found it hard to accept any alteration in its conclusions; and though he was quick to acknowledge any mistake it was a source to him of acute mental discomfort. To his pupils he remained always courteous and affectionate, and to them his death is a great personal loss; but the world also is the poorer by the loss of one of its great benefactors and one of its great men. O. H. W.-J.

DR. F. L. KITCHIN, F.R.S.

DR. FINLAY LORIMER KITCHIN was appointed palaeontologist to the Geological Survey of Great Britain in 1905. He was attacked by sudden illness on January 17, 1934, and died in St. Thomas's Hospital on January 20. The post which he held for nearly thirty years was one which required an accurate and wide knowledge of the whole field of palaeontological science, and he filled it with distinction and marked success. As a successor to such eminent men of science as Huxley, Salter, Etheridge, Shannon and Newton, he recognised the necessity of maintaining a high standard of performance and in no respect did his endeavours sink below the level of his predecessors.

Devoted to his subject, Kitchin was meticulously accurate, and at the same time he was able to co-operate freely not only with his official assistants but also with academic and other palaeontologists who sought his advice. Being in charge of one of the largest collections of British fossils, on the curation and growth of which he had spent a large part of his working life, he acquired an experience of British stratigraphical palaeontology which was probably unique. But he spared no efforts to secure the most accurate determinations, and he grudged neither time nor trouble, though often working on material which had less morphological value than stratigraphical interest. In this respect the value of his services to British geologists working in the field was unprecedented.

Kitchin's special sphere of work was in the province of Mesozoic palaeontology. His earliest thesis, for the degree of Ph.D. at the University of Munich, where he studied under Zittel, was on Indian Jurassic Brachiopoda, and among his most important contributions to British palaeontological stratigraphy were the two memoirs which he wrote with Dr. John Pringle on the Mesozoic rocks penetrated by borings in the coalfield of Kent. He also investigated the stratigraphy of the British Gault and contiguous formations, on which he wrote a number of useful papers. But he was very largely occupied by the preparation and editing of the palaeontological chapters of memoirs on British geology, and the value of his services in this direction cannot be measured in terms of the amount of output which can now be attributed to his name.