the effective charge has an intermediate value, say, αn, α being about 0·5, we obtain

$$\frac{d \log K_1}{d\varepsilon} = \frac{\alpha F}{RT} \; ; \; \alpha \sim 0.5 \; ;$$

which on comparison of the differential of equation A with respect to ε and by neglecting $\frac{d \log v/2}{d\varepsilon}$ can be identified with $\frac{d \log k_1}{d\varepsilon}$. If we measure k_1 by the intensity i of the current, we have $\log k_1 \propto \log i$ and finally

$$\log i = \frac{\alpha F \varepsilon}{RT} + \text{const.} \; ; \; \alpha \sim 0.5 \; ;$$

which is the well-known over-voltage equation of Tafel. This equation is thus interpreted as indicating that the effective charge of the transition state lies about half-way between that of the initial and the final states of the reaction.

The field of such generalizations has been extended to other variations of reaction velocity arising from changes in chemical constitution, from the transfer of a reaction from the gas phase into solution, and from variations of solvents.

The principle consists in introducing a parameter of the transition state arising from the general equation

$$\frac{d \log k_1}{d\chi} = \frac{p_1 - p_\tau}{RT} \quad . \quad . \quad . \quad (B)$$

where χ is an external parameter causing the variation in reaction rate and $p_1 - p_\tau$ is the change in the corresponding parameter accompanying the formation of the transition state from the initial state.

The advance in the various directions to which I have referred is, as yet, tentative, but the method seems to provide a rational framework for the interpretation of many empirical rules of reactivity as well as a guidance to the discovery of new relationships.

REFERENCES

The derivation of a reaction velocity from a statistical treatment of the transition state was first put forward by Wigner and Pelzer (*Z. phys. Chem.*, B, **15**, 445 ; 1932) in their treatment of the reaction $H + H_2^{para} = H_2 + H$; this treatment was generalized by Eyring (*J. Chem. Phys.*, **3**, 107 ; 1935) and by Evans and Polanyi (*Trans. Far. Soc.*, **31**, 875 ; 1935). The thermodynamic formulation equation (*A*) is due to the latter authors and to Wynne-Jones and Eyring (*J. Chem. Phys.*, **3**, 492 ; 1935). Equation (*B*) and its various applications sketched out in this paper are due to Evans and Polanyi (*Trans Far. Soc.*, **31**, 875 ; 1935 ; **32**, 1333 ; 1936).

Obituary Notices

Sir Albert Kitson, C.M.G., C.B.E.

SIR ALBERT KITSON, whose death occurred on March 8, was a geologist of world-wide repute, and the discoveries which he made and which are now being exploited in many parts of the world entitle him to be classed as one of the foremost economic geologists of his time.

Kitson was born in Manchester in 1868, but when six years old accompanied his parents to Australia. He entered the Civil Service of Victoria by competitive examination, and having a bent for geology he took courses in this subject at the University and School of Mines, Melbourne. Later on, he also took courses in mining and surveying, thereby equipping himself for the career which he was afterwards to follow.

As a result of his studies, Kitson was transferred to the Geological Survey of Victoria. In 1903 he became senior geologist, and while he occupied this post was responsible for some magnificent field work. In 1906 he went to Southern Nigeria as principal of the Mineral Survey, but resigned in 1911. In 1915 he was appointed director of the Geological Survey of the Gold Coast, which position he held until 1930 when he retired, having reached the age limit. So valuable were his services considered, however, that his period of service was extended five years beyond the usual period. It was while he occupied this position that his name became known in ever-widening circles, not only on account of the remarkable discoveries which have already been referred to, but also on account of the energy and drive which he put into his work. By many of the Gold Coast natives he was regarded as a fetish doctor owing to his seemingly reckless handling of snakes, an ability which he had acquired during his boyhood in the Australian bush. Nor did he know what fear meant. In the early days of his Southern Nigerian appointment, when he was geologizing in the wake of a punitive expedition, he was continually in trouble with the military authorities as he was always getting ahead of them.

Among Kitson's discoveries on the west coast of Africa may be mentioned the black and brown coalfields (Nigeria), manganese, bauxite, diamonds (Gold Coast) and many others of lesser importance, the development of which has contributed enormously to the prosperity of these two colonies. But he followed up these discoveries by coming home and describing their possibilities to interested parties in the business world of London for, as already indicated, he had the economic side of geology very strongly developed. Moreover, he was a great enthusiast and he managed by some subtle gift to impart his enthusiasm to others.

After his retirement, Kitson was requested by the Government of Kenya to carry out a preliminary geological survey with special reference to the

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discoveries of gold which had begun to interest financiers. He therefore went out in 1932 and made his report. All his recommendations were accepted by the Government, and although Kenya may never become one of the world's great goldfields, the progress made since his report was written is quite remarkable.

Kitson was responsible for many papers; indeed he was a most prolific writer on his subject. In 1918 he was awarded the Wollaston Fund by the Geological Society and in 1927 the Lyell Medal. He was president of Section C (Geology) at the Johannesburg meeting of the British Association in 1929; and he attended geological and mining conferences in many countries, nearly always as a responsible delegate. On his retirement he was warmly commended by the Secretary of State for the Colonies for his services on the West Coast. He was knighted in 1927, having previously been awarded the C.B.E. in 1918 and the C.M.G. in 1922. Within recent years he joined the boards of several mining companies, a distinction which has seldom fallen to any geologist. He was actively associated with many scientific and technical bodies and on some of these the present writer, who knew him for many years, was also actively associated.

Kitson had always something useful to say when he did take part in discussions, and his keenness and his enthusiasm will be sadly missed. He was indeed a remarkable man as the foregoing will indicate; it falls to the lot of few to be as well known 'in the City' as in scientific circles.

WE regret to announce the following deaths:

The Duchess of Bedford, D.B.E., fellow of the Linnean Society, author of papers on ornithology, well known for several aeroplane flight records, lost during an aeroplane flight last week, aged seventy-one years.

Brigadier-General Sir Capel Holden, K.C.B., F.R.S., director of mechanical transport in the Ministry of Munitions during the Great War, on March 30, aged eighty-one years.

Prof. Dragutin Gorjanovitch-Kramberger, professor of palæontology and geology in the University of Zagreb, who in 1896 discovered the remains of early man of Krapina of Neanderthal type, aged eighty years.

Mr. C. E. Haselfoot, fellow (formerly dean) of Hertford College, Oxford, lecturer in mathematics in Wadham College, from 1888 until 1913, on October 28, aged seventy-two years.

Prof. Paul Janet, director of the School of Electricity, Paris, formerly professor of physics in the University of Paris, aged seventy-three years.

Sir Thomas Mottram, C.B.E., formerly H.M. Inspector of Mines, on March 24, aged seventy-eight years.

Prof. D. A. Low, emeritus professor of engineering in East London (now Queen Mary) College, on March 24, aged eighty years.

News and Views

Prof. A. Hutchinson, O.B.E., F.R.S.

BY the retirement of the Master of Pembroke College, Cambridge, Dr. Arthur Hutchinson, emeritus professor of mineralogy in the University, under the age limit of the new statutes, the University loses the services of one of its outstanding figures. For many years as lecturer in crystallography and demonstrator of mineralogy during the long tenure of the chair of mineralogy by the late Prof. Lewis, before himself succeeding to the chair in 1926, Dr. Hutchinson was the life and soul of that Department, and the inspirer of most of the original investigations carried on therein. His own contributions to original research were many and noteworthy, and his affectionate care for the valuable and ever-increasing collection of crystals and minerals in the New Museums, while at the same time it was kept usually available for actual study, was obvious to all who entered the Department; it was indeed often remarked upon by the many distinguished foreign mineralogists who visited Cambridge, and enjoyed the kindly hospitality of Dr. Hutchinson and his devoted wife, herself the sister of another eminent man of science, the late Sir Arthur Shipley.

AMONG the most useful of Prof. Hutchinson's contributions to the advance of his subject were his ingenious aids to graphical crystallography, such as the Hutchinson stereographic protractor and net, and his simplification of crystallographic calculations by graphical methods. Also his universal apparatus for the measurement and optical examination of small crystals, described to the Mineralogical Society in 1911, has proved to be of maximum utility at minimum cost. Again, in his work in collaboration with Dr. A. E. H. Tutton on the exceptionally interesting optical properties of gypsum at different temperatures, it was a clever device of Dr. Hutchinson which enabled the exact temperatures for the changes to be determined for the first time with absolute certainty. Indeed, extreme accuracy was characteristic of him, and another instance of it was afforded by his memoir on colemanite, in which he showed that the so-called neocolemanite was a myth, being identical with colemanite itself, the mistake of other observers having been due to inaccurate methods. Dr. Hutchinson's services to the Mineralogical Society, to the membership of which he was elected so long ago as 1890, can never be overestimated, whether

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