

of the importance and status of technology, the promotion of which has already been discussed.

In any consideration of innovation in industry, however, problems of organization loom large, and the Advisory Council stresses the prime importance of management. In this connexion it is pointed out that this is a matter not merely of having scientists or technologists in the highest administrative posts, but equally of dispersing people with scientific and technological qualifications throughout the industrial organization. Such a state of affairs could enable minor technical problems to be solved quickly and major technical ones recognized and referred to the research department for handling by those qualified to do so. This again is part of the unsolved problem of stimulating research and development in the small or backward firm, and to that end this investigation by the Advisory Council does not contribute anything new. It suggests, however, that immediate attention be directed to a thorough study of the means of communication between the innovator and those responsible for determining policy. It also urges the need for examination of the social factors affecting innovation, such as case studies of the social consequences of a major innovation in one of Britain's mature industries.

In this its last report the Advisory Council on Scientific Policy has left its successor—or successors—with some definite lines of enquiry which should be continued or initiated. The report should remove any false ideas that rapid solutions are likely to result from any changes in organization alone: success is more likely to flow from persistent effort in many fields, above all, from effort unhampered by preconceived ideas of any kind. There may well be some concern as to whether the present changes, for a time at least, will impede progress and cause some overlapping or dispersion of effort. This would appear distinctly possible in the arrangements regarding manpower and the responsibility for technology, as well as for information services and libraries. Whatever the future may hold, the Advisory Council on Scientific Policy is manifestly entitled to the nation's gratitude for seventeen years of outstanding service to the nation and to science. Its record is unlikely to be surpassed, and may not be attained, unless its successors are accorded an authority and resources which the Advisory Council itself has never enjoyed.

VARIATION PRINCIPLES IN COLLISION THEORIES

Variational Principles in the Theory of Collisions

By Yu. N. Demkov. Translated from the Russian by N. Kemmer. Pp. x + 157. (London and New York: Pergamon Press, 1963.) 42s. net.

VARIATIONAL principles have played an important part in quantum mechanics almost from the very beginning. However, the first applications were confined to the discussion and approximate determination of the energies of bound states of nuclear, atomic and molecular systems. It was not until the 1940's that ways were found for applying variational principles to scattering problems. Since then a variational outlook on the treatment of collision phenomena has been developed which has not only provided new methods for approximate calculation of collision cross-sections but has also led to deeper and clearer theoretical understanding of non-stationary quantum phenomena.

Demkov has presented a very clear account of the way in which variational principles have been derived in collision theory. The first chapter discusses the formulation of the variational principles of Hulthén and of Kohn for both elastic and inelastic collisions. In the next chapter the connexions between these and other variational principles and also perturbation methods are discussed. Applications to the elastic collisions of electrons with hydrogen atoms are given in this chapter to illustrate the use of the principles for actual evaluation of approximate cross-sections. Chapter 3 deals with more formal questions of the symmetry properties of the functionals, the principles of detailed balance and the unitarity of the scattering operator, in terms of variational principles. Finally, in Chapter 4, variational methods are used to obtain results analogous to the virial theorem in classical mechanics.

The author's presentation is very clear and free from unnecessary formalism, while the translation is excellent. It is most instructive reading for any student of quantum mechanics and should certainly be examined carefully by anyone working on atomic collision problems. The only cause for regret is that the price of the book is so high.

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ELECTRONIC SPECTRA AND ORGANIC COMPOUNDS

Interpretation of the Ultraviolet Spectra of Natural Products

By Prof. A. I. Scott. (International Series of Monographs on Organic Chemistry, Vol. 7.) Pp. x + 443. (London and New York: Pergamon Press, 1964.) 84s. net.

INCREASING use of infra-red, nuclear magnetic resonance and mass spectra for the elucidation of the structures of organic compounds may have given the impression that the earlier-developed method of electronic spectra was no longer being used. Prof. Scott's book is a reminder that ultra-violet and visible spectra continue to play a valuable part among the tools of the organic chemist, especially the chemist concerned with natural products. The simultaneous use of all these techniques is advocated to reduce experimentation to a minimum, particularly where only minute amounts of labile material or compounds that are difficult to separate are being handled.

More information will be found in *Interpretation of the Ultraviolet Spectra of Natural Products* than is suggested by its title, because the first part deals systematically with simple chromophores, albeit from an empirical and phenomenological point of view. After an introduction there are chapters on single chromophores, conjugated chromophores, C-aromatic compounds, O-, S-, and N-hetero-aromatic compounds, each of which is liberally illustrated by examples. There is a short chapter by Dr. C. J. W. Brooks on miscellaneous applications with particular mention of analytical estimations and colour reactions. This leads on to the longest chapter, 85 pages, on the investigation of molecular structure, in which selected classes of natural products are discussed in greater detail. The final chapter takes a range of specific examples of natural products of quite complicated structures, including terramycin, shellolic acid, some alkaloids, mould metabolites, streptimidone, limonin and plumieride, and shows how the electronic spectra together with other spectroscopic and chemical evidence have allowed the structures to be elucidated. The book concludes with an appendix on steroids consisting mainly of 54 pages of tabulated spectra.

Some of the less desirable features of the book deserve comment. The index is inadequate, having only approximately 1,000 entries for 443 pages. Many readers will seek