MOLECULAR SPECTRA

The Identification of Molecular Spectra. By R. W. B. PEARSE and A. G. GAYDON. 221 + viii pp., 8 plates. New York: John Wiley and Sons, Inc. 1941. $8.00.

THE essential features of this book are (1) a "Table of Persistent Band Heads" arranged in order of wave-length, (2) a compilation entitled "Individual Band Systems" containing rather complete lists of band heads arranged according to molecules. In addition there are very helpful brief discussions on the purpose and method of use of the tables and on the spectroscopic sources from which band spectra are obtained. There are a useful appendix and an excellent set of plates showing reproductions of important band spectra. The book fills an important gap for research workers in the field of molecular spectra, who hitherto have had no systematic guide for the rapid identification of known bands. It may also help to make possible the use of band spectra in spectrochemical analysis.

The tables cover the range λ2,000–10,000. The attempt has been made to include all diatomic spectra and some of the simpler polyatomic spectra, but spectra of solutions, liquids and solids are excluded. In the Table of Persistent Heads, bands "of particularly frequent occurrence as impurities" are marked with asterisks. Here one might disagree somewhat with the assignment of asterisks, and also with the choice of spectra included in and excluded from the table. The strong short wave-length SO_2 absorption bands near λ2,200, which are not included, ought to be included and with an asterisk; the writer knows of at least three instances where these bands have turned up very deceptively as impurities, in the absorption spectra of such diverse substances as ICl, HF and AgBr. However, the table as it stands will be exceedingly useful in identifying bands, particularly since it gives an indication of the probable intensity of occurrence of each band in each of a variety of different types of sources.

The section on "Individual Band Systems," which forms the heart of the volume, gives a very helpful survey of the spectra of each molecule listed. Selected references are given, not necessarily to the latest work, but particularly to articles containing reproductions. Methods of excitation, and classification of the electronic states involved, when known, are also given. No attempt is made to give data or references on rotational structures of bands. Multiple band heads, when present, are, however, usually listed. For most molecules, all known bands are listed; for some, only the strongest bands; in a few cases, notably the halogens, where the number of bands is large, the list is omitted. A rather casual sampling indicates that there are a number of omissions in the diatomic list. Thus, four systems of AgI and AgBr bands[1] and one system of CuCl bands[2] are unmentioned, though certain SH^+ bands published slightly later[3] in the same journal are included. (Some references up to 1940 are included.) The red system of Br_2 is not mentioned, although the reference in which it was published[4] is given. The occurrence of BiCl bands in emission,[5] and the latest work on the λ2314 C_2 band, with a photograph, are also overlooked.[6] Deuteride spectra are entirely omitted. On the other hand, a number of spectra which have not yet appeared in other compilations are listed. The Herzberg bands of O_2 and the Finkelnburg-Steiner bands (probably O_4) are described as a single system. Continuous spectra, although mentioned in some cases (*e.g.*, H_2O and Cl_2 absorption) are usually (*e.g.*, H_2 emission, F_2, HCl, ICl and BrCl absorption) omitted. The coverage of triatomic spectra, while not intended to be complete, is good. The selection of polyatomic spectra presented seems somewhat arbitrary.

Thus while one can not rely on these tables for completeness, they will be exceedingly useful, both for the identification of unknown bands and as a survey which will be stimulating for further research. The general plan and arrangement, and the text in general, are excellent. The typography and appearance of the book are very attractive.

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REPORTS

DEFENSE WORK OF THE CARNEGIE INSTITUTION OF WASHINGTON[1]

IN accordance with authorization from the trustees, the services of staff members and the use of laboratory facilities of the Institution have been made available to the government. In some cases staff members have been given leave of absence in order to enter the rolls of governmental organizations; in others, their services have been made available while they remained on salary with the Institution, working either in our own or in governmental laboratories. At the present time

[1] From the Report of the President of the Carnegie Institution, Dr. Vannevar Bush.

[1] *Phys. Rev.*, 55, 636, 1113, 1939.
[2] *Ibid.*, 54, 497, 1938.
[3] *Ibid.*, 55, 894, 1939.
[4] *Ibid.*, 38, 1179, 1931.
[5] *Ibid.*, 37, 1710, 1931.
[6] *Ibid.*, 56, 769, 1939.