P R E F A C E.

The thesis deals with the emission spectra of chlorine, bismuth monochloride and bismuth monobromide molecules and is divided into five chapters.

Chapters I and II deal with the emission spectrum of chlorine excited in the presence of argon. Two band systems were obtained in the region 2600 - 2390A and 2365 - 2239A. As many as about 200 bands are obtained in the system 2600 - 2390A as against only 24 bands obtained by Elliott in the excitation by active nitrogen. The system 2365 - 2239A is new. Both the systems are analysed for the first time and the vibrational constants given. These systems are found to be analogous to the 2950 - 2670A and 2660 - 2590A systems of bromine. Both the systems are photographed with a 21-ft grating spectrograph.

Chapter III deals with the experimental data and the vibrational analysis of the band system 6170 - 4220A obtained by exciting BiCl₃ vapour with an uncondensed transformer discharge. As many as 390 bands are obtained in the present experiment as against only 140 bands obtained by earlier workers either in absorption or in emission by arc flame. The earlier work on this molecule in absorption was carried in a tube open to atmosphere while the earlier work in emission was done in flame open to atmosphere. A vibrational analysis of the bands obtained is given which is supported by the probable isotopic shifts observed.
It was found that the constants obtained by Morgan with the addition of the cubic term for the upper state explain practically all the bands observed.

Chapter IV deals with the rotational structure of four bands and the probable electronic terms involved in the band system 6170 - 4220Å of BiCl. The rotational structure of the BiCl molecule has been observed and studied for the first time. The rotational analysis gives the rotational constants, the vibrational-rotational-interaction constants as well as the internuclear distance for the upper and lower electronic states. The study of the rotational structure along with a detailed discussion of the electronic configuration enabled the determination of the probable electronic transition in the band system.

Chapter V deals with the emission spectrum of BiBr obtained by exciting BiBr$_3$ with an uncondensed transformer discharge. In the band system 5710 - 4650Å as many as about 240 bands are obtained in the present experiments as against only 61 bands recorded by Morgan in absorption. All the bands obtained have been analysed and the probable dissociation energies of the upper and lower states are obtained.

The different chapters in the thesis are written in a form suitable for publication. They will be submitted separately for publication during the next few weeks. Each chapter contains a separate introduction and a separate abstract. A general introduction is not therefore given.
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Baij Nath Khanna.

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