The thesis concerns with the emission spectra of silicon monochloride, germanium monochloride and silicon monobromide molecules. The relative vibrational transition probabilities for A-X systems of monofluorides of beryllium and boron have also been included.

Chapter I deals with the vibrational and rotational analyses of the bands of B-X system of the SiCl molecule. The bands have been recorded in the first and third orders of the Jarrell-Ash grating spectrograph. The upper state vibrational constants are modified. The rotational structure of (1,0), (0,0), (0,1) bands of subsystem B-X $^2\Pi_{3/2}$ and (0,0) band of subsystem B-X $^2\Pi_{1/2}$ have been studied. The results on the bands of subsystem B-X $^2\Pi_{3/2}$ have been published in Curr. Sci 38, 361, 1969.

Chapter II deals with the vibrational and rotational analyses of the B-X system of the GeCl molecule. The bands are recorded in the first order of the Jarrell-Ash grating spectrograph. The vibrational constants of the upper state have been modified. The (0,1) and (0,0) bands of subsystem B-X $^2\Pi_{3/2}$ have been recorded in the fourth order and the rotational analysis of these bands is performed.
for the first time. The results on the B-X system of GeCl molecule have been communicated for publication in Ind. J. Pure and Appl. Phys.

Chapter III deals with the vibrational and rotational analyses for the ultraviolet bands of the SiBr molecule. They are photographed in the first and fourth orders of the Jarrell-Ash grating spectrograph. The rotational analysis of (0,2) and (0,3) bands has been performed for the first time.

Chapter IV discusses the relative vibrational transition probabilities for the bands of A-X systems of the monofluorides of beryllium and boron. The r-centroids for the same systems are also evaluated graphically and the variation of electronic transition moment with the internuclear separation is discussed. The results on BeF molecule have been published in Ind. J. Pure and Appl. Phys. 7, 63, 1969. and on BF molecule in the J. Q. S. R. T., 10, 903, 1970.

The different chapters of this thesis are written in the form suitable for publication. Each chapter contains a separate introduction and abstract. Therefore the general introduction is not given.

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