SUMMARY

The present thesis is divided in 5 chapters.

Chapter one deals with Introduction, Review of earlier work on CH, its astrophysical significance and appearance in various celestial bodies etc. It’s importance and the motivation is also discussed.

Second chapter is mainly on the work of measuring the intensities of rotational lines of the P, and R branch lines of the (0,0) and (1,1) bands of the two subsystems $A^2\Delta_{5/2} - X^2\Pi_{3/2}$ and $A^2\Delta_{3/2} - X^2\Pi_{1/2}$ of CH molecule observed in solar flux and recorded on a Fourier Transform Spectrometer at Kitt Peak Observatory and National Optical Astronomy Observatory USA.

The P and R branches of (2, 2) band of $A^2\Delta_{5/2} - X^2\Pi_{3/2}$ system. The P, Q and R branch lines of (0,0) and (1,1) bands of $B^2\Sigma - X^2\Pi$ system and the lines of P and R branches of (0,0) band of $C^2\Sigma - X^2\Pi$ system are also used. In all intensities of 203 rotational lines were measured using an ‘origin’ software and by plotting proper parameters an average rotational temperature was calculated. An appropriate theory in this context is outlined. The average temperature comes as 4042 ± 168 K, which is in the range of surface temperature of sun.

In chapter 3, the Franck Condon factors and r – centroids were calculated for many bands of A-X, a-X, B-X and C-X systems. The Le Roy programme and few other programmes developed by Telle and Espy were also employed.

In chapter 4 the potential energy curves of the ground state are drawn using RKR potential and few other empirical potentials like Hulbert – Hirschfelder (H-H), Extended Rydberg, Dmitrieva – Zenevich (D-Z), Zavitsas and modified Zavitsas potential energy functions. In Zavitsas function some quantities in exponentials are not dimensionless. This error was modified and a new ‘modified Zavitsas function’ was suggested which was applied to ground state of CH. A function similar to Zavitsas, namely Dmitrieva – Zenevich function is also tested. A comparison with RKR is made, in which it was shown that the Extended Rydbergrg function is nearer to RKR.
Chapter 5 deals with the calculation of dissociation energy of CH in ground state. The Morse function, Rydberg function, ‘correlation coefficient method’ using H–H function were used and the average value was calculated which is nearer to the value recommended by Peter Bernath which is 3.49 eV.

Two papers based on chapters 4 and 5 are published and few papers are in preparation.