Introduction

Beside the important contribution of the spectroscopy in the early development of Atomic Physics, this recent trends in atomic spectroscopy have pushed the interest in the traditional dispersive spectroscopy, especially the term analysis into the back ground. Most of the people that all was to be known or needed to be known in term analysis has already been observed and theoretically interpreted quarter of a century or more ago. However, this view is far from true.

The availability of large dispersive instrument in the vacuum ultraviolet region like 10.7m normal and grazing incidence vacuum spectrograph, and the development of a variety of light sources, like laser produced plasma, Tokamak machine Synchrotron radiation facility, Theta Pinch, Condensed Spark, Sliding Spark, Triggered Spark and the fast moving ion beams from high energy accelerators etc on one side and the fast computer with huge memory capacity capable of calculating any complex structure and hence to analyze the complex spectra for which the analysis was cumbersome, the least, without the support of extensive calculations have brought scientist once again on front line.

The spectroscopy as a field of experimental and theoretical research has already contributed much to our knowledge concerning the physical nature of things knowledge not only of our own earth but of the sun, of interstellar space and of the distant stars.
Due to the revival of interest in the Astro-and Plasma Spectroscopy, the importance of studies in spectra emitted by neutral and ionized atoms has tremendously increased in the last few decades. For instance, the identification of the forbidden transition of Fe XIV in solar spectrum by Prof Bengt Edlén revealed for the first time that the estimated temperature of Corona must be of the order of millions of degrees.

The radiation from different atoms and ions produced by various light sources, when examined with a spectroscope reveals properties of the valence electrons involved. This is due to the fact that the spectrum of each atom or ion is unique, in so far as it is a pattern of lines where wave lengths and relative intensities are characteristic of that atom or ion only. A few basic information about the antimony is described below:

Antimony was recognized in compounds by the ancients and was known as a metal at the beginning of the 17th century and possibly much earlier. Its atomic weight is 121.75 ± 3 at no 51; m. p. 630.74 °C; b.p. 1950 °C it is not abundant, but is found in over 100 mineral species. It is found as antimonides of the heavy metals, and as oxides. It is extracted from the sulfides by roasting to the oxide, which is reduced by salt and scrap iron; from its oxides it is also prepared by reduction with carbon two allotropic forms of antimony exists: the normal stable, metallic form, and the amorphous gray form. Metallic antimony is extremely brittle metal of a flaky, crystalline texture. It is poor conductor of heat and electricity, and has a hardness of 3 to 3.5.
This thesis comprises of six chapters. The first chapter briefly describes the basic theory involve in the description of atomic spectra, various approximations used to solve the complicated integro differential equations etc. while the second chapter deals with the experimental set up and its recording details, preparation of line list and separation of ionization stages. The Chapter III - VI are devoted to describe the interpretation of Second, Third, Fourth and Fifth Spectrum of antimony in the light of Hartree-Fock relativistic calculations. Lastly some reproduction of the antimony spectra used for this analysis is given in the appendix part.