ABSTRACT

Knowledge of ionization cross sections is necessary for understanding collision processes and electron-atom interactions, as well as in several applied fields such as radiation science, astrophysics and plasma physics.

In the recent years, it has been used for finding the cross-section of gas phase atoms due to photon, electron and heavy particle impact because of their use in various fields such as ionization in the material, ionization in the biological and biomedical research and modeling of fusion plasma in the tokomaks. There is a strong impact on many other scientific areas, such as astrophysics, astrochemistry, atmospheric physics, radiobiological area, biological chemistry, x-ray laser and fusion research.

In this thesis, we have discussed about the expressions for the analytical calculation of ionization cross-sections by electron impact based on the binary encounter Bethe (BEB) model, Time-of-flight, Plasma Modeling valid from ionization threshold up to relativistic energies.

Using Jain Khare semi-empirical formulism we calculated the appearance potential for all the fragments formed after ionization of the atomic molecules. Our results were compared to data available for the atomic molecules with previously done theoretical or experimental theories or formalisms.

From these measurements we were able to extract useful information about the comparable data with the help of graphs.

Keywords: electron-impact; ionization; cross-sections; X-ray; transitions