CHAPTER – IV

DISCUSSIONS AND CONCLUSIONS

It will be appropriate to review and to point out the extent of the success in the present research work and to suggest further investigation.

The entire study of elastic scattering of electrons is divided in to two parts (1) scattering by He, Ne, Ar and U Atoms (2) scattering by He like positive ions in the higher energy range. The approximate methods which can give batter result than the FBA are described in chapter – I. The differential cross section are obtain using the approximations for the targets He, Ne, Ar and U atom. In chapter – II the various methods are applied to the atomic targets. The scattering amplitudc having order up to k_i^{-2} is obtain through High Energy Approximation (HHOB) and the study is extended for He iso-electronics targets. With the formulation of the EBS, Wallace Das and HHOB all the scattering contributions to thc DCS arc dcrivcd and cvaluatcd at incident energy in the range 200 ev to 10 keV. The static and direct potentials for the target where use in this investigation. The results are compared with othcr experimental and theoretical results

In the potential scattering static field approximation is mainly consider by DHFS parameters which gives accurate results then Cox–Bornham TF,TFD Potential parameters. Where as configuration interaction potential obtain from Hartree – Fock wave function. For the potential scattering partial wave analysis gives accurate solution as energy increases more number of partial waves are required for the scattering amplitude. In the case of high energy, Born series converges rapidly gives the satisfactory results evaluation of high order Born term is very difficult. EBS method including eikonal amplitude and second Born term is very much effective for the high energy range. In the Wallace method trajectory correction of incident electron gives small correction to the EBS results. Das and Modified Das method incorporate higher order born terms are also give batter results.

In the view of Born and Eikonal multiple scattering series virtual excitation occurs in the elastic scattering and when the incident wave vector comes out the target remains in the ground state only. So, the excitation must be considered. The effect of average excitation energy place an important role in the real part of second Bond term indicates inelastic effect in the elastic scattering is important The main difference between EBS and HHOB is the real part of order k_i^{-2}, which includes average excitation energy

parameter β_l. In the second BA this real part has a leading contribution in the DCS calculations at lower angular region.

The various numerical methods are used to evaluate DCS, during this calculations the program is cross checked with different logic and the results are also checked with Turbo C and Mathematica programming languages. It should be noted that

1. The conversion of unit should be done properly.
2. The zero of the basal function must be considered while evaluating J_0, K_0.
3. The proper step height is required to calculate partial wave derivative.
4. Initialisation of the variable , array is required before its use.

In the case of high energy elastic scattering EBS, Das method and HHOB approximation gives better results. Strong peak and Oscillatory nature not found in DCS as reported by Geiger et al. For large value of l Dirac phase shift is decreasing function of l. the decrease of $|\ \delta_l\ |$ with l is not rapid as compared to low energy projectile. EBS approximation give good agreement between theory and experiment at energy greater then 400ev where the born series is not rapidly convergent EBS results are in good agreement with partial wave calculations as the incident energy increases. HHOB theory is applied first time in the case of elastic scattering of electrons from ions.

The Mathematica Language is only the advance tool to maintain The accuracy in calculation of partial wave derivatives involved in scattering amplitude formula which can be obtain very well and effectively.

Based on this discussions and conclusions the future plan can be made for the improvements and the extensions of our investigations.

i) Evaluation of second Born terms for ionic targets in Ne iso-electronic series is possible with the extension of HHOB presented in this work.

ii) Effect of absorption and polarization corresponding to different angle can be studied from different individual terms in the imaginary and real part of the second Born amplitude .

iii) PWA in the case of electron iron elastic scattering is to be considered for comparison of present theoretical results.

iv) High energy scatting of electron with the described methods in chapter – II for semi conductor atoms like Si , Ge can be performed.

v) Different available wave functions can be employed for the targets consider here for the comparative study.

vi) Modified coulomb approach can be consider according to Joachain.

vii) Total cross sections can be obtained for the targets consider in this work.