

List of figures

<i>Figure 1.1 Effect of Electromagnetic waves on molecular systems.....</i>	15
<i>Figure 1.2 Earth aurora.....</i>	19
<i>Figure 1.3 Aurora on brown dwarf.....</i>	19
<i>Figure 1.4 Aurora on Uranus</i>	20
<i>Figure 1.5 Aurora on Rogue planet</i>	20
<i>Figure 1.6 Aurora on Neptune</i>	20
<i>Figure 1.7 Aurora on Jupiter</i>	20
<i>Figure 1.8 Aurora on Mars</i>	20
<i>Figure 1.9 Aurora on Venus</i>	20
<i>Figure 1.10 Aurora on Saturn.....</i>	21
<i>Figure 1.11 DNA strand damage caused by electrons.....</i>	22
<i>Figure 2.1 Schematic diagram for scattering of projectile particles from target system</i>	34
<i>Figure 2.2 Parameter A vs Z.....</i>	47
<i>Figure 2.3 A - A(Z) vs α</i>	48
<i>Figure 2.4 Flow diagram for inner region target calculation</i>	61
<i>Figure 2.5 Inner area program flow diagram.....</i>	61
<i>Figure 2.6 Outer area calculation flow diagram.....</i>	62
<i>Figure 3.1 e^- - HD collision cross-sections.....</i>	72
<i>Figure 3.2 e^- - D_2 collision cross-sections.....</i>	73
<i>Figure 3.3 e^- - D_2O collision cross-sections.....</i>	74
<i>Figure 3.4 e^- - ND collision cross-sections</i>	75
<i>Figure 3.5 e^- - ND_2 collision cross-sections</i>	76
<i>Figure 3.6 e^- - ND_3 collision cross-sections</i>	77
<i>Figure 3.7 e^- - SiD collision cross-sectios</i>	78
<i>Figure 3.8 e^- - SiD_2 collision cross-sections</i>	79
<i>Figure 3.9 e^- - SiD_3 collision cross-sections</i>	79
<i>Figure 3.10 e^- - CD_2 collision cross-sections.....</i>	80
<i>Figure 3.11 e^- - CD_3 collision cross-sections</i>	81
<i>Figure 3.12 e^- - CD_4 collision cross-sections.....</i>	82
<i>Figure 3.13 Comparison of Q_{ion} between D_2O and H_2O</i>	84
<i>Figure 3.14 Comparison of Q_{ion} between ND_3 and NH_3.....</i>	84

<i>Figure 3.15 Correlation between Q_{ion} (peak) and polarisability (α)</i>	85
<i>Figure 3.16 Correlation between Q_{ion} (peak) and α/IE</i>	85
<i>Figure 3.17 Present Q_{ion} for e^--H_2SO_4 collision.....</i>	89
<i>Figure 3.18 Cross-sections of H_2SO_4 and H_3PO_4.....</i>	90
<i>Figure 4.1 Geometrical structure of nucleosides.....</i>	99
<i>Figure 4.2 Q_{inel}, Q_{ion} and $\sum Q_{exc}$ for Adenosine</i>	101
<i>Figure 4.3 Q_{inel}, Q_{ion} and $\sum Q_{exc}$ for Cytidine</i>	101
<i>Figure 4.4 Q_{inel}, Q_{ion} and $\sum Q_{exc}$ for Guanosine</i>	102
<i>Figure 4.5 Q_{inel}, Q_{ion} and $\sum Q_{exc}$ for Uridine</i>	103
<i>Figure 4.6 Q_{inel}, Q_{ion} and $\sum Q_{exc}$ for Thymidine.....</i>	103
<i>Figure 4.7 Q_{el} for all Nucleosides.....</i>	104
<i>Figure 4.8 Q_T for all Nucleosides</i>	105
<i>Figure 4.9 Relative estimation of various quantified molecular processes</i>	106
<i>Figure 4.10 Chemical structure of Furfural</i>	107
<i>Figure 4.11 Chemical structure of para-Benzoquinone.....</i>	108
<i>Figure 4.12 Q_{inel}, Q_{ion}, and $\sum Q_{exc}$ for e^--$C_5H_4O_2$ (furfural)</i>	111
<i>Figure 4.13 Q_{inel}, Q_{ion}, and $\sum Q_{exc}$ for e^- - $C_6H_4O_2$ (para-Benzoquinone).....</i>	112
<i>Figure 4.14 Q_{el} and Q_T for e^--$C_5H_4O_2$ (furfural)</i>	114
<i>Figure 4.15 Q_{el} for e^- - $C_6H_4O_2$ (para-Benzoquinone).....</i>	115
<i>Figure 4.16 Q_T for e^- - $C_6H_4O_2$ (para-Benzoquinone).....</i>	116
<i>Figure 4.17 Diagrammatic representations of fluoronitrile molecules (https://pubchem.ncbi.nlm.nih.gov)</i>	119
<i>Figure 4.18 Inelastic processes for C_3F_5N</i>	120
<i>Figure 4.19 Inelastic processes for C_4F_7N</i>	121
<i>Figure 4.20 Elastic processes for C_3F_5N</i>	122
<i>Figure 4.21 Elastic processes for C_4F_7N</i>	123
<i>Figure 4.22 Correlation between Present Q_T (2p-SEM) and Z (Number of molecular electrons)</i>	124
<i>Figure 4.23 Correlation between Q_T (2p-SEM) and Number of valence electron (N_v)</i>	125
<i>Figure 4.24 Correlation between Q_T and dipole polarizability (α).....</i>	125
<i>Figure 4.25 Correlation between Q_{ion}(peak) and dipole polarisability (α)</i>	126
<i>Figure 4.26 Correlation between Q_{ion} (peak) and Z.....</i>	127
<i>Figure 4.27 Correlation between Q_{ion} (peak) and polarizability (α)</i>	128
<i>Figure 4.28 Variation of Q_{ion} (peak) with N_c.....</i>	129

<i>Figure 4.29 Correlation between $Q_{ion}(\text{peak})$ and dielectric constant (through CM equation)</i>	131
<i>Figure 4.30 Variation of $Q_{ion}(\text{peak})$ with ϵ</i>	131
<i>Figure 5.1 Inelastic interaction CSs for Adenine</i>	144
<i>Figure 5.2 Inelastic interaction CSs for Guanine</i>	145
<i>Figure 5.3 Inelastic interaction CSs for Cytosine</i>	145
<i>Figure 5.4 Inelastic interaction CSs for Thymine</i>	146
<i>Figure 5.5 Inelastic interaction CSs for Uracil</i>	147
<i>Figure 5.6 Elastic interaction CSs for Adenine</i>	148
<i>Figure 5.7 Elastic interaction CSs for Guanine</i>	149
<i>Figure 5.8 Elastic interaction CSs for Cytosine</i>	149
<i>Figure 5.9 Elastic interaction CSs for Thymine</i>	150
<i>Figure 5.10 Elastic interaction CSs for Uracil</i>	150
<i>Figure 5.11 IMFP for aqueous Adenine</i>	155
<i>Figure 5.12 IMFP for aqueous Cytosine</i>	157
<i>Figure 5.13 IMFP for aqueous Guanine</i>	158
<i>Figure 5.14 IMFP for aqueous Thymine</i>	159
<i>Figure 5.15 IMFP for aqueous Uracil</i>	160
<i>Figure 5.16 IMFP of DNA molecules and liquid water</i>	161
<i>Figure 5.17 IMFP for gaseous Adenine and aqueous Adenine</i>	161
<i>Figure 5.18 IMFP for gaseous Cytosine and aqueous Cytosine</i>	162
<i>Figure 5.19 IMFP for gaseous Guanine and aqueous Guanine</i>	163
<i>Figure 5.20 IMFP for gaseous Thymine and aqueous Thymine</i>	163
<i>Figure 5.21 IMFP for gaseous Uracil and aqueous Uracil</i>	164
<i>Figure 5.22 MSP for aqueous Adenine</i>	166
<i>Figure 5.23 MSP for aqueous Cytosine</i>	167
<i>Figure 5.24 MSP for aqueous Guanine</i>	168
<i>Figure 5.25 MSP for aqueous Thymine</i>	170
<i>Figure 5.26 MSP for aqueous Uracil</i>	171
<i>Figure 5.27 Present MSP for DNA molecules and liquid water</i>	172
<i>Figure 5.28 3D plot of absorbed dose for Adenine</i>	173
<i>Figure 5.29 3D plot of absorbed dose for Cytosine</i>	174
<i>Figure 5.30 3D plot of Absorbed Dose for Guanine</i>	174
<i>Figure 5.31 3D plot of absorbed dose for Thymine</i>	175

<i>Figure 5.32 3D plot of absorbed dose for Uracil</i>	175
<i>Figure 5.33 Dose vs Energy plot for DNA molecules and liquid water at distance $r = 100 \text{ \AA}$</i>	176
<i>Figure 6.1 Eigen phase sum for $e^- - CH_2F_2$ scattering</i>	190
<i>Figure 6.2 Q_{MTCS} for $e^- - CH_2F_2$ scattering</i>	191
<i>Figure 6.3 Q_{EDCS} for energies 1.5 eV, 10 eV, 15 eV, and 20 eV.....</i>	192
<i>Figure 6.4 Q_{el} for $e^- - CH_2F_2$ scattering using SE model.....</i>	194
<i>Figure 6.5 $Q_{el} e^- - CH_2F_2$ scattering using SEP model.....</i>	194
<i>Figure 6.6 $Q_{el} e^- - CH_2F_2$ scattering.....</i>	195
<i>Figure 6.7 Inelastic cross-sections for $e^- - CH_2F_2$ scattering.....</i>	196
<i>Figure 6.8 Total cross-sections for $e^- - CH_2F_2$ scattering</i>	197
<i>Figure 6.9 Q_{MTCS} for $e^- - CH_3F$ scattering.....</i>	202
<i>Figure 6.10 Q_{EDCS} at 5 eV and 10 eV energy for $e^- - CH_3F$ scattering</i>	203
<i>Figure 6.11 Q_{el} for $e^- - CH_3F$ scattering</i>	204
<i>Figure 6.12 Inelastic cross-sections for $e^- - CH_3F$ scattering</i>	205
<i>Figure 6.13 Total cross-sections for $e^- - CH_3F$ scattering</i>	206