

## CONTENTS

	Page No.
Declaration.	i
Certificate.	ii
Preface.	iii
Acknowledgements.	v
 <b>CHAPTER I</b>	
Introduction.	1
References.	16
 <b>CHAPTER II</b>	
Theory.	
II.1 Out line of Reaction Mechanism.	19
II.1.1 Direct Reactions.	21
II.1.2 Compound Nuclear Reactions.	21
II.1.3 Statistical Model for Compound Nuclear Reaction.	22
II.2 Theory of Preequilibrium Models.	31
II.2.1 Exciton Model.	32
II.2.2 Master Equation Model.	37
II.2.3 Intranuclear Transition Rate.	38
II.2.4 Fermi gas Equilibrium Model.	41
II.2.5 Hybrid Model.	43
II.2.6 Geometry Dependent Hybrid Model.	47
II.2.7 Preequilibrium Models for Complex Particle Emission.	49
II.2.8 Quantum Mechanical Theory.	54
II.2.9 Preequilibrium Angular Distributions.	59
II.2.10 Important Improvements in Hybrid Model .	67
References .	72

## CHAPTER III

### Instrumental Details and Experimental Technique .

III.1	Techniques of Measurement.	75
III.1.1	In-beam Technique.	75
III.1.2	Off-beam Technique.	75
III.2	Outline of Radiation Detection.	76
III.2.1	Ge ( Li ) Detectors for High Resolution Gamma ray Spectroscopy.	78
III.2.2	High Purity Germanium Detector ( HPGe).	79
III.2.3	$\gamma$ -ray Detection in Semiconductor Detector.	80
III.2.4	Germanium Detector Spectroscopy System.	82
III.2.5	Energy Calibration of the Ge Detector.	85
III.2.6	Efficiency Calibration of the Ge Detector.	86
III.3	Outline of the Experimental Procedure.	88
III.3.1	Irradiation of Foil Stacks.	91
III.3.2	Decay Characteristics .	93
III.3.3	Data Accumulation.	93
III.3.4	Determination of Reaction Cross section.	94
III.3.5	Isotopic Reaction Contribution.	99
III.3.6	Isobaric Precursor Contribution.	100
III.3.7	Determination of Alpha Particle Flux.	101
III.3.8	Error Analysis.	103
	References.	106

## CHAPTER IV

### Experimental Results.

IV.1	Alpha Particle Induced Reactions in the Target Element Gold.	107
IV.2	Alpha Particle Induced Reactions in the Target Element Antimony.	113
IV.3	Alpha Particle Induced Reactions in the Target Element Indium.	119
IV.4	Alpha Particle Induced Reactions in the Target Element Iron.	124
	References.	129

## CHAPTER V

Comparison of Experimental Results with Theoretical Predictions.	131
V.1 $(\alpha, xn)$ Type of Reactions.	136
V.2 $(\alpha, pxn)$ Type of Reactions.	146
V.3 $(\alpha, \alpha xn)$ Type of Reactions.	152
V.4 Fraction of Preequilibrium Particle Emission.	153
References.	155
Summary and Conclusions.	157
Appendix.	164
List of Research Papers.	169