

STUDIES ON TECHNOLOGICAL BASED UTILIZATION OF MUNICIPAL SOLID WASTE

by

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CERTIFICATE

This is to certify that this thesis entitled '**Studies on Technological Based Utilization of Municipal Solid Waste**' being submitted by Mr. Ramesh Kumar Jalan to the Indian Institute of Technology, Delhi for the award of the degree of **Doctor of Philosophy** is a record of bonafide research work carried out by him. Mr. Ramesh Kumar Jalan has worked under my supervision and has fulfilled the requirement for the submission of the thesis.

The results contained in this thesis have not been submitted in part or in full, to any other University or Institute for the award of any degree or diploma.

V.K. Srivastava 20/3/96

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Dedicated to My Parents

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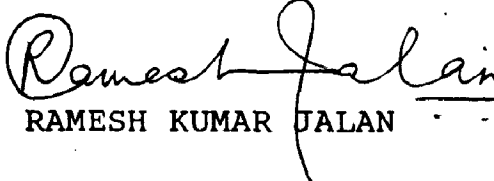
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ABSTRACT

The present work involves the study of various waste management sectors including landfilling, pyrolysis, composting, incineration and recycling. Detailed mathematical models are developed for pyrolysis to predict the concentration and temperature profiles over a wide range of operating conditions. The results obtained from the model were in close proximity to those available in the literature for other models developed and experiments conducted.

The concentrations of the various pyrolysis components viz. gases, volatiles and char is predicted based on two different kinetic models. In the first kinetic model the concept of an intermediate is introduced which is difficult to define physically and measure experimentally. However, in the second kinetic model, the above anomaly is removed and it is postulated that volatiles, gases and char of a particular composition are converted to volatiles, gases and char of different types. The concentration data predicted for the main pyrolysis products is used as an input parameter to the economic model (using Kinetic Scheme-II). Other parameters of technical nature for the remaining waste management sectors required for the economic model is obtained from the literature.

The economic model developed is for allocation of resources to the various waste management sectors mentioned above based on technical and economic parameters. The economic model utilizes physical systems theory and System Dynamics. The model equations are developed in "DYNAMO" language. The allocation coefficient Vs. time data are plotted graphically for the various waste management sectors utilizing both biodegradable and non-biodegradable waste. However, realistic data has been used for the above study as actual data to the extent required is not available in the literature. The above study clearly highlights the importance and methodology for resource allocation of MSW to various Waste Management Sectors.

CONTENTS

ACKNOWLEDGEMENT		
ABSTRACT		
LIST OF FIGURES		
LIST OF TABLES		
NOMENCLATURE		
PAPERS PUBLISHED / COMMUNICATED / PRESS		
CHAPTER - I	: INTRODUCTION	1 - 12
CHAPTER - II	: LITERATURE SURVEY	13 - 90
CHAPTER - III	: APPROACH TO MUNICIPAL SOLID WASTE MANAGEMENT SYSTEM	91 - 129
CHAPTER - IV	: KINETIC SCHEMES DEVELOPED	130 - 139
CHAPTER - V	: DEVELOPMENT OF MODEL FOR TEMPERATURE PREDICTIONS	140 - 150
CHAPTER - VI	: ECONOMIC MODEL	151 - 174
CHAPTER - VII	: RESULTS AND DISCUSSIONS OF TECHNICAL MODEL	175 - 288
CHAPTER - VIII	: RESULTS AND ANALYSIS OF ECONOMIC MODEL	289 - 304
CHAPTER - IX	: CONCLUSION	305 - 309
REFERENCES		310 - 328
APPENDIX		332 - 331
COMPUTER PROGRAMMES		
- TECHNICAL MODEL		332 - 346
- ECONOMIC MODEL		347 - 363
- RESULTS FROM COMPUTER SIMULATION OF ECONOMIC MODEL		364 - 375