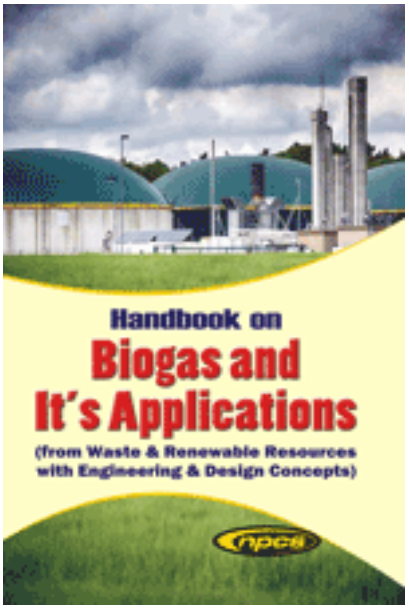
Entrepreneur India

106-E, Kamla Nagar, New Delhi-110007, India.
Tel: 91-11-23843955, +91 9097075054
Mobile: +91-9097075054
Email: npcs.ei@gmail.com, info@entrepreneurindia.co
Website: www.entrepreneurIndia.co



Handbook on Biogas and Its Applications(from Waste & Renewable Resources with Engineering & Design Concepts)(2nd Revised Edition)

Code	NI114
Format	paperback
Indian Price	₹0
US Price	$0
Pages	384

ISBN	9789381039779
Publisher	NIIR PROJECT CONSULTANCY SERVICES

Description

Bio Gas typically refers to a gas produced by the biological breakdown of organic matter in the absence of oxygen. Organic waste such as dead plant and animal material, animal dung, and kitchen waste can be converted into a gaseous fuel called Bio Gas. Bio Gas is basically a mixture of methane and carbon dioxide; it originates from biogenic material and is a type of bio fuel. It is a low cost form of energy derived from renewable waste resources: animal manures, agricultural residues, industrial wastewater, human waste and other organic materials. Bio Gas has been used widely as a source of energy and waste treatment, and as liquid fertiliser for soil enhancement, since long time. Digestion the underlying biological process of Bio Gas technology leads to a renewable energy service that ensures a distributed energy production, in which the energy is produced at the point of consumption or demand. A Bio Gas digester, which produces the Bio Gas, also provides an excellent agricultural waste management solution, most notably animal manures. Also, capturing methane generated in a Bio Gas digester has an immensely important role to play with respect to rural energisation, poverty alleviation and development, increased industrial and agricultural efficiency and competitiveness, and improved management of our greenhouse gas emissions. The major applications of Bio Gas are as fertilizer, fuel gas, methane production, mechanical and electrical power production, diesel engine operation, etc. Bio Gas technology is one of the fastest growing renewable energy sectors worldwide, with the annual market growth exceeding 30% each year.
This book majorly deals with Bio Gas plants, raw materials for Bio Gas generation, utilization of Bio Gas and slurry, engineering design of Bio Gas units for developing countries, engineering aspects of small scale Bio Gas plants, a village scale Bio Gas pilot plant study using high rate digester technology, structural behaviour and stress conditions of fixed dome, simplified anaerobic digesters for animal waste, mechanical and electrical power from Bio Gas in developing countries, fuel gas production from organic wastes by low capital cost batch digestion, the toxicity effect of pesticides and herbicides on the anaerobic digestion process, the toxicity effect of pesticides and herbicides on the anaerobic digestion process, Bio Gas manure as a complete fertilizer, feasibility for Egyptian farmers etc.
The book contains technology of Bio Gas generation with its applications. This book will be an invaluable resource for researchers, consultants, entrepreneurs, institutional libraries, students etc.

Content

1. BIOGAS PLANTS: A BOON FOR RURAL FAMILY
Composition of biogas and slurry
Composition of slurry
Raw materials for biogas generation
Types of biogas plants
KVIC floating drum type
Janata biogas plant
Deenbandhu biogas plant
Shramik Bandhu biogas plant
Selection of size of biogas plant
Selection of type of biogas plant
Factors to be considered
Technical considerations
Consideration of Climatological factors
Consideration of Geographical factors
Economic considerations
Utilization of biogas and slurry
(a)Utilization of biogas
(b)Biogas burners
(c)Chapatti burner
(d)Biogas lamps
(e)Utilization of slurry as manure Composition of slurry
Wet slurry Dried slurry
Other uses of slurry In Pisciculture
In Mushroom production Advantages
Limitations

2. ENGINEERING DESIGN OF BIOGASUNITS FOR DEVELOPING COUNTRIES
Design concepts used for floating cover Indian style digesters Design concepts used for a Chinese digester
Design concepts used for a bag digester Items to consider in examining a system
Operational factors
Composition of the organic feed-stockRetention times
Concentrations of the feed-stocksOrganic loading rate
Degree of mixing
Heating and heat balance Location of a digester system Slurry effluents
Construction materials Sizing of the digester
Size based on health criteria
Size based on production of soil conditioner Size based on energy

Design example
case 1 : fresh manure and urine
case 2 : manure and concrete pad not collected daily case 3 : manure on the ground, partially dried
case 4 : using destruction of volatile solids case 5 : design using ESCAP (Indian) approach case 5 A : fresh manure adn urine
case 5 B : manure from a concrete pad case 5 C : manure on dirt Construction costs
Conclusions

3. ENGINEERING ASPECTS OF SMALL SCALE BIOGAS PLANTS
Structural demands
Relation between the length and height of the bearing structure Size of the Digester
Size of gasholder Gasholder-digester ratio 30 days retention time (RT) 60 days RT
90 days RT
120 days RT
Engineering for extension programs Concluding remarks

4. AN IMPROVED PLUG-FLOW DESIGN FOR THE ANAEROBIC DIGESTION OF DAIRY CATTLE WASTE
Introduction Methodology Description of the plant Mixing and feeding tank Anaerobic digester
Biogas piping and storage
Digester heating station
Capital costs
Results and discussion
Conclusions
5. A VILLAGE SCALE BIOGAS PILOT PLANT STUDY USING HIGH RATE DIGESTER TECHNOLOGY
Digester
Insulation of digester and gas-holder
Slurry heating system
Operation of plant and presentation of data
Discussions of results
Conclusions

6. COMPOST-HEATEDSMALL SCALE FARM DIGESTER APPROPRIATE FOR KOREAN CONDITIONS
System design and construction
Biogas generation from pig manure
Results and discussion
Organic material loading conditions

Maintaining high temperature by compost heat
Heat loss comparison
Economic feasibility

7. STRUCTURAL BEHAVIOUR AND STRESS CONDITIONS OF FIXED DOME TYPE OF BIOGAS UNITS
Base of fermentation tank
Wall of fermentation tank
Dome of gas-holder
Construction technique
Analytical considerations
Structural testing of biogas unit
Concluding remarks

8. FERROCEMENT GASHOLDER FOR TWO 60M3 DIGESTER
Procedures for construction of a 20 M3 gasholder
(1)Construction of the mould
(2)Reinforcement
(3)Plastering
(4)Gas-tightness
(5)Inner-steel structure Conclusions

9. SIMPLIFIED ANAEROBIC DIGESTERS FOR ANIMAL WASTE
Batch digester plant
Results
Plug flow digester plant
Results
Covered lagoon biogas system
Results
Continuous expansion digester
Tests on a small electric generator set fuelled by biogas
Results
An economic evaluation of the plants
Conclusions

10. COLD CONDITION BIOGAS
Methodology
Results and discussion

11. MECHANICAL AND ELECTRICAL POWER FROM BIOGAS IN

DEVELOPING COUNTRIES
Engines modification for bio-gas use
Performance of biogas fuelled engines
Main factors limiting use of bio-gas fuelled engines and -
prospective solutions

12. PERFORMANCE OF A SMALL DIESELENG IN EOPERATING
IN A DUAL FUEL MODE WITHBIOGAS
Objectives of the research
The test unit
Fuels used
Test procedure
Evaluation of the test results
Discussion of the test results
Power out-put
Exhaust gas temperature and combustion
Specific fuel consumption and fuel savings
Efficiency
Comparision of mixing chamber types
Conclusions and recommendations

13. METHANE PRODUCTION FROM FARM WASTES
History of application of farm digesters
Post World War II developments
Post 1970 developments
American farm digesters
Technical problem
Economic feasibility of farm waste digestion
Barriers to application of anaerobic digestion to farm wastes Technical approaches to system improvements
Research needs

14.OPTIMIZATION OF BIO-CONVERSION OF SOLID AND
LIQUID RESIDUES
Technological aspects
1.Parallel operation
2.Series (stages) operation
3.Phased operation Advantages of phased operation
Fixed film and suspended growth reactors
1.Fixed bed
2.Expanded bed

3.Fluidized bed
4.Anaerobic rotating discs
5.Recycled bed
A.Contact or recycled flocs
B.Fluidized flocs or sludge blanket
C.The digestor
Choice of process and reactor type Micro-organisms
Bio-chemical study of the process
1. Screening of the Electron Transfer proteins and Enzymes 2.Purification Processes.
Bacterial control of the digester through co-factor analysis.

15. NOVEL PROCESS FOR HIGH-EFFICIENCY
BIO-DIGESTION OF PARTICULATE FEEDS
Limitations of conventional anaerobic digestion Novel process concepts
Phase separation High-SRT Digesters
Two-phase digestion of semi solid feeds Studies with CSTR Digesters
Studies with upflow digesters
Dominant reactions in first and second stage digesters Advantages of two-phase fermentation mode and the up flow...
digester
Energetic and economic advantages of two-phase digestion Two-phase digestion of solid feeds
Summary and conclusions

16.BIOGAS FROM ORGANIC WASTE DILUTED WITH SEA WATER
Materials and methods
The organic waste
The synthetic seawater
The Inoculum
The digestion apparatus
Experimental procedure
Analytical procedures
Methane content
Results and discussion
Conclusion

17.FUE LGAS PRODUCTION FROM ORGANIC WASTES BY LOW CAPITAL COST BATCH DIGESTION
Background on "controlled" landfilling
Process description
Conventional landfill gas recovery

Application of enhancement to agricultural residues
Status of landfills as fuel gas sources in the United States

18. BIOGAS PRODUCTION FROM WATER HYACINTH (EICHHORNIA CRASSIPES) : INFLUENCE OF TEMPERATURE
Materials and methods
Fermenter
Substrate
Inoculum
Analytical Methods
Experimental procedure
Results and discussion

19. THE TOXICITY EFFECT OF PESTICIDES AND HERBICIDES ON THE ANAEROBIC DIGESTION PROCESS
Materials and methods Results and discussions
Effects of Lindane and DDT on anaerobic digestion of mixtures of cotton stalks and cow-dung.
Effect of Gesapax and Gesaprime on the anaerobic digestion of mixture of water Hyacinth and fresh cow-dung.
Effect of Gesapax and Gesaprime on the anaerobic digestion of mixture of weeds and fresh cow-dung.
Conclusion

20. BIOGAS PRODUCTION FROM SOME ORGANIC WASTES
Materials and methods
Organic wastes
Geranium flour
Akalona
Watermelon residues Citrullus Vulgaris
Starter
Digestion apparatus
Analytical procedures
Gas volume
Methane content of the biogas
Determinations of total solids
Experimental
Results and discussion
Biogas from geranium flour (gf)
Biogas production from Akalona (Ak)
Biogas production from Watermelon residue (WR)

21. THE ASSESSMENT OF CELLULYTIC ACTIVITIES IN ANAEROBIC DIGESTERS BY THE"TEXTILCOUPONnTECHNIQUE"
Experimental
The use of the screw-capped tubes
The crimped-caped-serum tubes
Results and discussion
Discussion

22.BIOGAS PRODUCTION FROM ANTIBIOTIC- CONTAMINATED
COW MANURE
Materials and methods
Experimental procedure
Results
Discussion

23. BIOGAS FROM LIQUID AGRO-INDUSTRIAL WASTES
DERIVED FROM BANANA AND COFFEE PROCESSING

24. A SIMPLE, RAPID AND ACCURATE METHOD FOR DETERMINATION OF CARBON-DI-OXIDEIN BIOGAS
Background Theory Material Procedure
Estimation of Methane content Validation

25. ASSESSMENT OF ANAEROBICALLY DIGESTED SLURRY
AS A FERTILIZER AND SOIL CONDITIONER
Fertilization effect on effluents on field-grown wheat in clay soil Microbiological and chemical analysis
Result
Composition of effluents from bio-gas plants Introduction
Methodology Effluents sources
Detection of phytotoxicity Methods of handling effluents
Fertilization effect of effluents on corn (pot experiment) Fertilization effect of effluents on wheat (pot experiment) Effect of continuous feeding on effluent composition
Phytotoxic effect of digester effluent
Changes in fertilizer value of digester effluents during handling and storage.
Effluents as soil conditioner
Fertilizer value of the digester effluents Effect on nutrient uptake
Yield response to fertilizer application Discussion

26. REPEATED APPLICATION OF ANAEROBICALLY DIGESTED SLURRY AND ITS EFFECT ON THE YIELD AND NPK UPTAKE OF WHEAT, TURNIPS AND ONIONP LANTS

Methodology Materials Experimental Chemical analysis
Results and discussion Effect on the dry matter yield Wheat plant
Turnip plant Onion plant
Effect on Nitrogen, Phosphorus and Potassium uptake

27. BIOGAS MANURE AS A COMPLETE FERTILIZER, FEASIBILITY FOR EGYPTIAN FARMERS
Composition of bio-gas manure and treatments Aim and scope of work
Results and discussion
Short term effect of bio-gas manure
Maize
Wheat
Rice
Broad bean
Cotton
Spinach
Carrots
The residual effect of bio-gas manure
Residual effect of bio-gas manure on Wheat
Residual effect of bio-gas manure on Broad bean

28 .HEALTH RISKS ASSOCIATED WITH THE USE OF BIOGAS SLURRY: AN INTRODUCTORY NOTE

29. INCIDENCE, PERSISTENCE AND CONTROL OF PARASITIC EGGS AND CYSTS IN ANAEROBICALLY DIGESTED WASTES
Methodology
1.Incidence of Ascaris eggs and Eimeria Oocysts in different village digester.
2. Laboratory-controlled experiments Aeration of the sludge after 45 days Results and discussion
1.Incidence of Ascaris eggs and Eimeria Oocysts in different village digester
2.Laboratory-controlled experiments
Conclusion
Incidence, persistence and control of some pathogens during anaerobic digestion of organic wastes
Methodology
Isolation and identification of the pathogens Results
Isolation of pathogens in samples obtained from different operating village digester.
Persistence and control of pathogens during anaerobic digestion of sludge under laboratory conditions
Discussion

30. SURVIVAL OF PATHOGENS AND PARASITES DURING THE ANAEROBIC DIGESTION OF ORGANIC WASTES
Methodology
Laboratory digester
Organic wastes
Fermentation experiments
Biogas Analysis
Chemical Analysis
Microbiological determinations
Results and discussion

31.DEVELOPMENT AND APPLICATION OF BIOGAS TECHNOLOGY FOR RURAL AREAS OF EGYPT
Background and objective
The preliminary fact-finding phase
Outline of the R & D activities
The demonstration phase
Future plans
Conclusions

32. BIOGAS PRODUCTION FROM KITCHEN REFUSES OF ARMY CAMPS OF EGYPT USING A TWO STAGE BIOGAS DIGESTER
Materials and methods Materials fed to the digester Plant description
Inlet tank Main digester Gas-holder
Operation of the system Experimental
Methods of analysis
Methane content in the biogas CO2 content
Results and discussion
1.Heating
2.Mixing

33. AN INTEGRATED RENEWABLE ENERGY SYSTEM PROJECT OVERVIEW
Project objectives
Design considerations
System components
Operation concept
Technical Data

34.PHOTOGRAPHS OF PLANT & MACHINERY WITH SUPPLIERS’S CONTACT DETAILS

About Niir

NIIR Project Consultancy Services (NPCS) is a reliable name in the industrial world for offering integrated technical consultancy services. Its various services are: Pre-feasibility study, New Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Preparation of Project Profiles and Pre-Investment and Pre-Feasibility Studies, Market Surveys and Studies, Preparation of Techno-Economic Feasibility Reports, Identification and Selection of Plant and Machinery, Manufacturing Process and/or Equipment required, General Guidance, Technical and Commercial Counseling for setting up new industrial projects and industry. NPCS also publishes various technology books, directories, databases, detailed project reports, market survey reports on various industries and profit making business. Besides being used by manufacturers, industrialists, and entrepreneurs, our publications are also used by Indian and overseas professionals including project engineers, information services bureaus, consultants and consultancy firms as one of the inputs in their research.