

**GMR Institute of Technology**  
An Autonomous Institute Affiliated to JNTUK, Kakinada



(Accredited by NBA, NAAC with 'A' Grade & ISO 9001:2008 Certified Institution)

## **NANO MATERIALS AND NANO PARTICLES**

*A Term Report submitted in partial fulfillment for the*

*award of the degree of*

**BACHELOR OF TECHNOLOGY**

*in*

**CHEMICAL ENGINEERING**

*Submitted by*

**SRIKANTH BADUGU**

Jntu no: 18341A0803

**SATISH CHINTADA**

Jntu no: 18341A0807

**VENKATESH VAKA**

Jntu no: 18341A0819

*Under the guidance of*

**DR.DEESHIKA DATTA**

**GMR Institute of Technology, Rajam,**

**Andhra Pradesh, India.**

**07/07/2021.**

**GMR Institute of Technology**

An Autonomous Institute Affiliated to JNTUK, Kakinada



**GARIT**

Training Tomorrow's  
Engineers Today

## **Department of Chemical Engineering**

### **CERTIFICATE**

*This is to certify that the report entitled **Nanomaterials and Nano particles** submitted by **Srikanth, Satish, Venkatesh** bearing Reg. No. 18341A0803,18341A0807,18341A0819 has been carried out in partial fulfilment of the requirement for the award of degree of **Bachelor of Technology in Chemical Engineering** of **JNTUK, KAKINADA** is a record of bonafide work carried out by them under my guidance & supervision of Dr. Deepshika Datta. The results embodied in this report have not been submitted to any other University or Institute.*

Signature of Guide

**Dr. DEEPSHIKA DATTA**

**Professor**

**Department of Chemical Engineering**

Signature of the Head of the Department

**Dr. S.N. DASH**

**Professor &HOD**

**Department of Chemical Engineering**

## CONCLUSION

Nano Materials are one of the important materials which has a huge application and intensified properties in various fields of survey. These materials having enhance properties are widely used in a number of specific applications like Medical, Advance Material synthesization, Bio Medicalproduction, Cosmetics and Electro Magnetic application etc... This work explains the advantages and disadvantages of various Nano Materials. The types and structures of Nano materials are also elaborately discussed likeQuantom Dots, Fullerenes, Dendrimers etc... The different forms of Nano materials are elaborately discussed with specific pictures. This work further elaborates the process of conversion of large particles into nano size by techniques like Sol-Gel, Pyrolysis etc... The production technique of Organic and Inorganic Nano materials are also detailed in this work. The modern technology incorporates the application of Nano Bio fiber for production by hybridized composites. Thus, this work focusses on detailed method of synthesization, structure representation, application, properties and advantages of Nano materials for future sustainability.



## ABSTRACT

Nano materials can be defined as the materials possessing at minimum, one external dimension measuring 1-100nm. These materials can have **different physical and chemical** properties to their bulk form counter parts. Now a Days usage of **Nanomaterials** has been rapidly increasing. Advancements of materials have led to the development of Nanomaterials which have various specific applications in the modern technology. This review suggests the various properties, applications, structural representations, characteristics of different types of Nano materials like Nano Silica etc. The size, shape and production technique are also enlarged with the detailed explanation of Nanomaterials from different sources. This review future exploits the process of conclusion of large sized particles into Nano materials by using different type of techniques such as **Sol-Gel, The Emulsification-Solvent Displacement Method, Pyrolysis**. Production of nanomaterials has been constantly evolving over the last few years for manifold applications in **electronic, optical and biomedical fields**. This work further explains about the production of Nano materials in different forms specifying its types. The total review elaborately justifies the various characterized techniques followed like **SEM, TEM, FTIR, TGA, BET**, Mechanical properties and Bio-degradability assessment of the categories of Nanomaterials.



**EFFECT OF MEDIA ON BED HEIGHT  
SETTLEMENT AND LEACHATE  
COMPOSITION IN BIOREACTOR LANDFILL**

*A final year project report submitted in partial fulfilment of the  
requirement for the*

*award of degree of*

**BACHELOR OF TECHNOLOGY**

*In*

**CHEMICAL ENGINEERING**

*Submitted by*

**Aditya Shetty (17341A0801)**

**K. Sesha Sai Nadh (17341A0808)**

**R.V.S. Suryanarayana (17341A0818)**

*Under the esteemed guidance of*

**Dr. Deepshikha Datta**

Assistant Professor

Dept of Chemical Engineering

**GMR Institute of Technology**

**An Autonomous Institute Affiliated to JNTUK, Kakinada**

(Accredited by NBA, NAAC with 'A' Grade & ISO 9001:2008  
Certified Institution)

**GMR Nagar, Rajam-532127**

**Andhra Pradesh**

**July 2021**

**GMR Institute of Technology**

An Autonomous Institute Affiliated to JNTUK, Kakinada



**GMRIT**

Training Tomorrow's  
Engineers Today

**Department of Chemical Engineering**

**CERTIFICATE**

This is to certify that the thesis entitled "**Effect of Media on Bed Height Settlement and Composition of Leachate in a Bio-reactor Landfill**" submitted by **Aditya Shetty (17341A0801), K. Sessa Sai Nadh (17341A0808), R.V.S. Suryanarayana (17341A0818)** has been carried out in partial fulfilment of the requirement for the award of degree of **Bachelor of Technology in Chemical Engineering** of **GMRIT, Rajam** affiliated to **JNTUK, KAKINADA** is a record of bonafide work carried out by them under my guidance & supervision. The results embodied in this report have not been submitted to any other University or Institute for the award of any degree.

**Signature of the Guide**

**Dr. Deepshikha Datta**

Assistant Professor

Department of Chemical Engineering

GMRIT, Rajam

**Signature of the HOD**

**Dr. S. N. Dash**

Professor and HOD

Department of Chemical Engineering

GMRIT, Rajam

## ABSTRACT

The huge demand for plastic use, inadequacy in waste management and casual community behavior towards proper disposal of them create a remarkable threat to the life on Earth. The garbage waste which consists of plastic bags upon exposure to rainwater and the moisture content present in the landfill proceeds to leachate generation and this poses a major influence on design and operation of landfill. The present work emphasizes on the effect of different types of wastes and LDPE polymeric films on bed height settlement and composition of leachate, kitchen wastes and poultry wastes are the two degrading mediums used in the bioreactor. which is a major portion of the municipal solid waste. The objective of the present work is the keen observation of the bed height settlement of kitchen waste having different weight percent of polymeric films and the measurement of the leachate volume taken out from different bio-reactors. The quality and property of leachate has been checked by considering various parameters like COD, pH, conductivity, TDS and salinity. It has been noticed that there is an encouraging effect on prolonged biodegradation on leachate formation and successive waste bed settlement due to the presence of plastics. It was observed that there was no leachate formation in poultry waste reactors due to absence of moisture content. Hence the present work will assist in mollifying the alarming threat inflicted by plastic disposal on municipal solid waste.

*Keywords: Kitchen waste; Settlement height; Biodegradation, Leachate; COD*

## 6. CONCLUSION

Landfilling is a cheap and efficient method of waste disposal yet it has various disadvantages such as toxic leachate generation and greenhouse gas production. It also requires huge land area, labour and constant monitoring. Even after the landfill stops receiving waste materials, post closure plan is required which requires the operator or the owner to take care of the landfill for up to 30 years. Due to these constraints' bio-reactor landfill was developed to increase the biodegradation process by recycling of leachate and reducing time to 10 to 50 years which generally takes 50 to 100 years in a conventional landfill. The replacement of conventional landfill with bioreactor landfill will require more research, pilot plant studies. Thus, understanding of bioreactor is essential.

MSW consists major portion of vegetable waste. This organic fraction on degradation generates leachate in large quantities which can contaminate groundwater near the landfill which is not maintained properly. In the present study 180gms of organic kitchen waste generated 113 ml of leachate over a period of 40 days. The presence of plastics in MSW also effects the rate of waste degradation and composition of leachate. Other studies indicate the presence of polymeric materials in landfills enhance the rate of degradation as they act as a packing material which increases the contact area and residence time between the leachate and solid wastes. From the results it is evident that pre-treatment of leachate is essential before discharging into environment.

The poultry waste which is another waste contributor to MSW showed very slow rate of degradation. Thus, physical, chemical and biological transformations are required for this type of waste in order to improve its biodegradation in the landfill. Bed-height settlement is also an important parameter in designing of landfill. Modelling and studying of various wastes settlement are required to design better bio-reactors and conventional landfills. The only efficient solution for waste management problems is source reduction.