

Review Article

Aerobic Composting – A Short Review

Sunil Jayant Kulkarni

Datta Meghe College of Engineering, Airoli, Navi Mumbai, Maharashtra, India

ABSTRACT

The treatment of solid waste can be carried out by various methods like sanitary landfill, composting and incineration. Aerobic and anaerobic digestion methods have their own advantages and disadvantages. Aerobic method needs diffusion of air through waste. Also sizeable amount of sludge is produced in aerobic method. Aerobic methods are most common in the waste treatment because of simplicity and effective treatment. The studies reveal that it is important to achieve an optimal system for processing organic waste.

Key words: Aerobic composting, anaerobic composting, decomposition, degradation.

INTRODUCTION

Treatment of waste water and solid waste is one of the major problems faced by modern civilization. The conventional wastewater treatment plant contains primary, secondary and tertiary treatment methods. Biological methods are highly efficient for domestic wastewater because of its high BOD to COD ratio. Activated sludge process and trickling filters are commonly used treatment methods. [1-6] Adsorption is also effective for removal of organic matter. [7,8] Membrane separation methods can be used as an advanced treatment method. [9,10] The treatment of solid waste can be carried out by various methods like sanitary landfill, composting and incineration. Aerobic and anaerobic digestion methods have their own advantages and disadvantages. [11,12] Aerobic method needs pumping and bubbling of air. Also sizeable amount of sludge is produced in aerobic method. Aerobic methods are most common in the waste treatment because of simplicity and effective treatment. In this review paper attempt is done to review some recent

studies and researches carried out on aerobic composting.

REVIEW ON AEROBIC COMPOSTING

Narkhede et. al. studied changes in parameters like pH, temperature, moisture content, organic carbon, volatile solids during aerobic composting. [13] In their experimentation, they used a box model composter made up of wood. They observed that the temperature increased from the first day itself. It reached 60 degree Celsius on day 25. At the end of process, it dropped down to 28 degree Celsius. It took 35 days to reach the constant temperature conditions. They also observed that the moisture content was unstable during the process. They concluded that combined aerobic composting was acceptable alternative. Buyukgungor and Gurl studied the treatment of waste by using biological methods. [14] In their studies, they discussed the aerobic treatment methods such as activated sludge process, trickling filters and rotating biological contactors. Cosic et.al. initiated research to characterize the

biodegradability of leachate from composting tobacco waste. [15] They carried out investigation in batch reactor with different initial concentrations of leachate. According to them, use of activated sludge is an effective way of treating leachate with high concentrations of organics. Wadkar et.al. prepared a cylindrical reactor for aerobic thermophilic composting of municipal solid waste. [16] They studied characteristics of the sludge like pH, moisture content, temperature, C/N ratio and volume reduction. Their studies indicated that the values of these parameters were within the desired limits and compost was suitable for ornamental plants. Alleman and Mitchell carried out investigation on the initial treatment of all biodegradable solid wastes. [17] They evaluated operational parameters to optimize solids degradation and resource recovery. Jereb discussed waste management of biodegradable waste. [18] According to him, it is important to achieve an optimal system for processing organic waste. This can be accomplished by regulating and speeding up natural biological processes. According to him, all kind of organic fraction of municipal solid waste can be treated by composting. They observed that most common methods are composting, anaerobic decomposition and fermentation. Saveyn and Eder provided a possible technical proposal on end-of-waste criteria for biodegradable waste. [19] They explored possibilities for recovering biodegradable waste through composting and/or digestion. Ghaly et.al. carried out a review on textile effluents. [20] According to him presence of toxic metals can affect efficient growth of microorganisms. Also the process requires a long retention time. Font et. al. carried out studies on main types of VOC emitted in organic waste treatment facilities. [21] In their investigation, they also studied the methods used to detect and quantify these compounds. According to Asnani, solid waste management is one among the basic essential services provided by municipal authorities. [22] He observed that many times, the system applied is

unscientific, outdated and inefficient. According to him, improvement in soil texture and augmenting of micronutrient deficiencies are main advantages of composting. According to studies carried out by Hamer, one of the main concerns from public health point of view is safety and acceptability of many widely used solid waste management practices. [23] They discussed waste management practices such as disposal, treatment, reduction, recycling, segregation and modification.

CONCLUSION

The treatment of solid waste can be carried out by various methods like sanitary landfill, composting and incineration. Aerobic and anaerobic digestion methods have their own advantages and disadvantages. Aerobic method needs air for oxidation of organic matter. Also sizeable amount of sludge is produced in aerobic method. Aerobic methods are most common in the waste treatment because of simplicity and effective treatment.

REFERENCES

1. E. Gasparikova, S. Kapusta, I. Bodík, J. Derco, K. Kratochvil, "Evaluation of anaerobic-aerobic wastewater treatment plant operations", *Polish Journal Of Environmental Studies*, 2005, 14(1), 29-34.
2. Pallavi Amale, Sunil Kulkarni, Kavita Kulkarni, "A review on research for industrial wastewater treatment with special Emphasis on distillery effluent", *International Journal of Ethics in Engineering & Management Education*, 2014, 1(9), 1-4.
3. Sunil Kulkarni, Pallavi Amale, "A Review on Advanced Oxidation Method for Waste Water Treatment", *International Journal of Engineering Sciences and Management Research*, 2015, 2(8), 33-38.
4. Medhat M. A. Saleh And Usama F. Mahmood, "Anaerobic Digestion Technology For Industrial Wastewater Treatment", *Eighth International Water Technology Conference, IWTC8 2004, Alexandria, Egypt.*,817-833.
5. Melvin-Guy Adonadaga, "Nutrient Removal Efficiency of Activated Sludge Plants Treating Industrial and Municipal Wastewater in Ghana", *Journal of*

- Environment Pollution and Human Health, 2009, 2(3), 58-62.
6. Ihsan Flayyih Hasan Al-Jawhari, Noor Jabar Mhail and Saher Abed Al-Rutha Ali, "Efficiency of Some Filamentous Fungi to Treatment of Effluent Petroleum Wastewaters from Refinery", *Int.J. Curr. Microbiol. App.Sci.*, 2015, 4(4), 625-641.
 7. Sunil Kulkarni, "Removal Of Organic Matter From Domestic Waste Water By Adsorption", *International Journal of Science, Engineering and Technology Research*, 2013, 2(10), 1836-1839.
 8. Sunil J. Kulkarni, Ajaygiri K. Goswami, "Adsorption Studies for Organic Matter Removal from Wastewater by Using Bagasse Fly ash in Batch and Column Operations", *International Journal of Science and Research*, 2013, 2(11), 180-183.
 9. Sunil J. Kulkarni, Ajaygiri K. Goswami, "Applications and advancements in treatment of waste water by membrane technology- a review", *International Journal Of Engineering Sciences & Research Technology*, 2014, 3(9), 446-450.
 10. Maulik Acharya, "Separation Of Isopropyl Alcohol – Water By Hybrid Distillation Pervaporation System", *International Journal Of Scientific Research*, 2016, 5(1), 598-599.
 11. Ravi P. Agrahari, G. N. Tiwari, "The Production of Biogas Using Kitchen Waste", *International Journal of Energy Science*, 2013, 3(6), 408-415.
 12. Yiu C Chan, Rajiv K Sinha and Weijin Wang, "Emission of greenhouse gases from home aerobic composting, anaerobic digestion and vermicomposting of household wastes in Brisbane (Australia)", *Waste Management and Research*, 2010, 29(5), 540–548.
 13. S.D. Narkhede, S.B. Attarde And S.T. Ingle, "Combined Aerobic Composting Of Municipal Solid Waste And Sewage Sludge", *Global Journal Of Environmental Research*, 2010, 4(2), 109-112.
 14. Hanife Buyukgungor And Levent Gurel, "The Role Of Biotechnology On The Treatment Of Wastes", *African Journal Of Biotechnology*, 2009, 8(25), 7253-7262.
 15. Ivana Cosic, Kristijan Kolacko, Marija Vukovic, Nina Kopicic, Felicita Briski, "Aerobic Treatment Of Leachate From Tobacco Waste", 38th International Conference Of Ssche, May 23–27, 2011, 196-204.
 16. D V Wadkar, P R Modak, V S Chavan, "Aerobic Thermophilic Composting Of Municipal Solid Waste", *International Journal Of Engineering Science And Technology*, 2013, 5(3), 716-718.
 17. Dr. James E. Alleman, Dr. Cary Mitchell, "Solid-Phase Thermophilic Aerobic Reactor (Star) Processing Of Fecal, Food, And Plant Residues", *Annual And Monthly Reports Advanced Life Support - NASA Specialized Center Of Research And Training (Als-Nscort)*, 2006, 1, 1-27.
 18. Gregor Jereb, "Biodegradable Municipal Solid Waste Management", *Seminar Work, Modern Trends In Environmental Sciences, Nova Gorica Polytechnic School Of Environmental Sciences Graduate Study Programme Of Environmental Sciences*, 2004,1, 1-22.
 19. Hans Saveyn and Peter Eder, "End-Of-Waste Criteria For Biodegradable Waste Subjected To Biological Treatment (Compost And Digestate):Technical Proposals", *Final Report December 2013, Ipts Sevilla, Spain*, 1,1-230.
 20. Ae Ghaly, R Ananthashankar, M Alhattab And Vv Ramakrishnan, "Production, Characterization And Treatment Of Textile Effluents: A Critical Review", *J. Chem. Eng Process Technol.*, 2014, 5(1), 1-18.
 21. Xavier Font, Adriana Artola And Antoni Sanchez, "Detection, Composition And Treatment Of Volatile Organic Compounds From Waste Treatment Plants", *Sensors*, 2011, 11, 4043-4059.
 22. P. U. Asnani, "Solid Waste Management, India Infrastructure Report", 2006, 1, 161-190.
 23. Geoffrey Hamer, "Solid Waste Treatment And Disposal: Effects On Public Health And Environmental Safety", *Biotechnology Advances*, 2003, 22, 71–79.

How to cite this article: Kulkarni SJ. Aerobic composting – a short review. *International Journal of Research and Review*. 2017; 4(2):73-75.
