

Reduce Toxins in Waste

S.M. Mosharof Hossain¹, Jannatul Ferdousi² and Shah Newaz³

¹Department of Physics, Ramchandrapur School & College, Bogra, Bangladesh.

²Department of Physics, Uttara University, Dhaka, Bangladesh.

³Lathigonj School and College, Gabtoli, Bogra, Bangladesh.

Abstract - The study reveals to reduce toxins in waste in to reusable components. It can reduce waste in all three phases such as solids, liquids and gases by using a single process instead of several other processes in each individual phase.

1. INTRODUCTION

Waste management is very important in all three phases which requires various waste management plants such as sewage water treatment, bio-gas production plant and garbage disposal plants or landfills [1]. All these existing processes reduce toxic levels in waste to minimal levels [1]. However, in few cases waste can't be managed to greater and reliable extent using any of the existing processes. Especially when dealing with polymers it's even more inevitable. Moreover, all forms of waste can't be treated at a time with a single process or plant [1]. So, there is a necessity to embark upon new process which can process all forms of waste at a time with minimal effort. It is also equally important to reduce toxins to completely usable components or degradable components including polymers [2].

2. APPROACH

2.1. Idea

To have a process which can perform and fulfil objectives of all the other processes at a time it should comprises all the stages of existing process or alternative substitute methods at corresponding stages of the process. Therefore, all the common stages are bypassed and rest of the stages or their substitute methods are correspondingly performed to fulfil desired process.

2.2. Sewage water treatment plant

The sewage water is subjected to sludge digestion and disinfection at primary and secondary treatment [2]. These can also be done by subjecting sewage water to high temperature and pressure [3]. Rather than chlorination and sludge digestion methods boiling sewage water can complete both the processes at time [2].

2.3. Garbage disposal

The garbage is disposed into landfills and are burned at regular intervals or else dry garbage is used in thermal power production plant [4]. Wet garbage is used in production of bio-gas production. This needed to be simple in molecular structure. Basically wet garbage is fed to a bacterium which breaks complex molecular structures to simple molecular structures such as starch to glucose [4]. This can also be substituted by using high temperature and pressure [3]. This method can also degrade polymers and plastics particularly thermoplastics by thermal decomposition technique [3].

3. METHODOLOGY

Bypassing common stages in all the above plants can fulfil desired task at the same time several process can be accomplished at one instance. Therefore, sandwiching combustion process with sewage water treatment and thermal decomposition is expected [3][4]. Dry garbage used in thermal power production is similarly used for heat generation here. Bio-gas generated from wet garbage can be used for additional heat production [3][4][2]. Finally, when gases are released due to combustion they are entrapped and dissolved in water and other non-polar solvents which are subjected to effluent treatment just like ion bed treatment and reverse osmosis treatment for water.

Thus wastes in three phases are managed without releasing toxins into the environment.

1. Characteristics

- Self-sustainable:

Adaptive waste management should not consume any resources other than waste. It must use one form of waste as catalyst to treat other form

- Cost effective:

It should not be expensive to install, maintain or repair. At the same time it should convert toxins into reusable components.

- Feasibility:

Waste may vary with composition and concentration from one locality to other. Then Adaptive waste management should be designed to adapt for particular composition and perform the process. It should provide facility to choose by products and resultants during the process at-least during designing process.

- Construction and Functions:

It should be easy to design and manufacture. It must also perform complex functioning process without any errors or defects.

- Eco-friendly:

It should contribute for sustainable possessive growth and pollution free.

4. MODE OF USE

Basically it can exist in various modes such as rectangular lateral, rectangular column, cubic and cylindrical.

A. Rectangular Lateral

The method is sandwiching boiler and thermal decomposition chamber with combustion chamber. Since all the chambers are arranged in a vertically to each other this is called as rectangular lateral adaptive waste management system.

B. Rectangular column

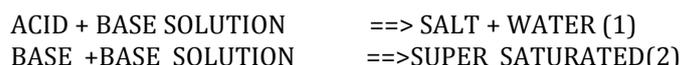
In this method all the chambers are arranged horizontally. In other words boilers lies left to the combustion chamber and thermal decomposition lies right to the combustion chamber or vice-versa.

C. Cubic/Cuboids

Here internal chamber supports combustion where as external combustion is divided into boiler and thermal decomposition chambers based on the requirement. Here the process is commenced in circular manner where as chambers are designed to be cubic or cuboids in structure. If the chambers are cylindrical then it is a cylindrical adaptive waste management system. It also works similar to the cubic/cuboids waste management system.

5. WORKING

When heat is subjected through combustion chamber boiler and thermal decomposition chamber receives heat and water above 100oC gets separated from sewage sludge in the form of steam and it collected and later subjected to effluent treatment [5][3]. Sludge obtained from boiler and ashes from combustion process can be used as fertilizers. Thermal decomposition chamber receives heat and uses the heat to break complex molecular structures to simple compounds. Even polymers degrade above 250oC temperature based on their nature at the same time it can also be used to convert wet garbage to dry garbage by dehydration technique which again can be subjected to combustion chamber [5][3]. Gases released from the combustion chamber are dissolved in base saturated water [7]. When these liberated gases are acidic in nature then they tent react with bases and form salt and water [6]. If these gases are basic in nature they form super saturated solution which need to effluent treatment [6].



REFERENCES

- [1] David Briggs, et al. "Health Impact Assessment Of Waste Management Facilities In Three European Countries." Environmental Health: A Global Access Science Source 10.Suppl 1 (2011): 53-65. Academic Search Premier. Web. 15 Feb. 2012.
- [2] Metcalf & Eddy, Inc. (1972). Wastewater Engineering. New York: McGraw-Hill Book Company. ISBN 0-07-041675-3.
- [3] Lide, David R. CRC Handbook of Chemistry and Physics, 90th Edition. Publisher: CRC Press 2009. ISBN 978-1420090840
- [4] Basic Information on Biogas, www.kolumbus.fi. Retrieved 2.11.07
- [5] M. A. Villetti, J. S. Crespo, M. S. Soldi, A. T. N. Pires, R. Borsali and V. Soldi. Thermal degradation of natural polymers. Journal of Thermal Analysis and Calorimetry, Vol. 67 (2002) 295~303
- [6] IUPAC gold book, <http://goldbook.iupac.org/D01751.html> Smith, Michael B.; March, Jerry (2007), Advanced
- [7] Organic Chemistry: Reactions, Mechanisms, And Structure (6th ed.), New York:
- [8] Wiley-Interscience, ISBN 0-471-72091-7