

An Integrated approach to Municipal Solid Waste Management

Hardik Sandish¹, Himanshu Padhya²

¹ Post Graduate Student, Town and Country Planning,
Sarvajani College of Engineering & Technology, Surat – 395001

² Associate Professor in Faculty of Civil Engineering,
Sarvajani College of Engineering & Technology, Surat – 395001

Abstract

Strong waste administration all over world is looked as significant test to common bodies. Pune partnership has taken activities to gather, isolate and treat strong waste and framework for dealing with around 1600 MT/day is usable. Fertilizing the soil, biogas and dormant waste reuse are available method of treatment. Praj Industries restricted, Pune has taken the action further to perceptible level and can coordinate by and large waste administration exercises so that from biodegradables, biodiesel, bio CNG, fuel ethanol and fluid fertilizer can be securely created. No waste is left finished. Biodegradable strong waste in Pune can possibly create Biodiesel-18 to 20 MT/day, Fuel ethanol-7 to 9 M3/day, BioCNG-10 to 12 MT/day and what's more 1100 to 1200 M3 fluid compost/day can be delivered. These energy rich mixes can produce power, run vehicles and keep up strong ripeness. One needs to glance experimentally in the improvement of assortment and isolation from where waste produces.

Keywords:-Municipal Solid Waste Management, Waste generation, Collection, Segregation, L and Filling, Dumping

Date of Submission: 22-01-2021

Date of acceptance: 06-02-2021

I. INTRODUCTION

Disorderly Municipal strong waste (MSW) removal framework, increment in populace drives weight on environments and upsets different nature cycles and human wellbeing. In spite of having lower squander age by India than created nations, the image of waste administration in the greater part of the Indian towns, urban communities so far shows gigantic degree for development. Created nations are a long ways ahead and have set benchmarks on strong waste administration. Pune Municipal Corporation has taken lead and has begun tending to different issues. Isolation of MSW is the enormous test; numerous NGOs and charitable associations are approaching to give their best so that further preparing has gotten reasonable.

1. Pune Corporation Solid Waste Generation

Pune is spread over 331.3 square KM and has populace over 31.20 lacs. Enterprise has taken activities to gather, isolate and transport strong waste from different districts to preparing units. Numerous activities are likewise taken to teach residents to limit waste age. Different projects on open mindfulness and support are likewise taken up by Pune Corporation. In addition, company has set up logical offices to comprehend arrangement of strong waste from various areas and produced information base that screens everyday tasks. Around 1600 MT strong waste is gathered every day from Pune city averaging around 400 g/day/capita squander age.

2.1 Treatment procedure developed by Praj.

Praj Industries Limited, Pune, The Global organization in the field of refineries and distilleries is additionally driving in the field of corporate social obligations



Fig. 1 Bio-degradable waste before homogenization



Fig. 2 Bio-degradable food waste after homogenization

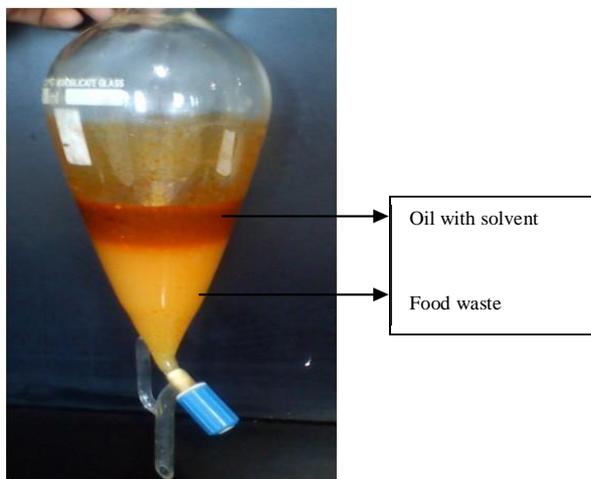


Fig. 3 Dissolvable extraction, upper layer contain dissolvable alongside oil and bio-degradable waste in base



Fig. 4 Aging of food waste in 5 liter Erlenmeyer jars

II. RESULT AND DISCUSSION

Block flow diagram:-

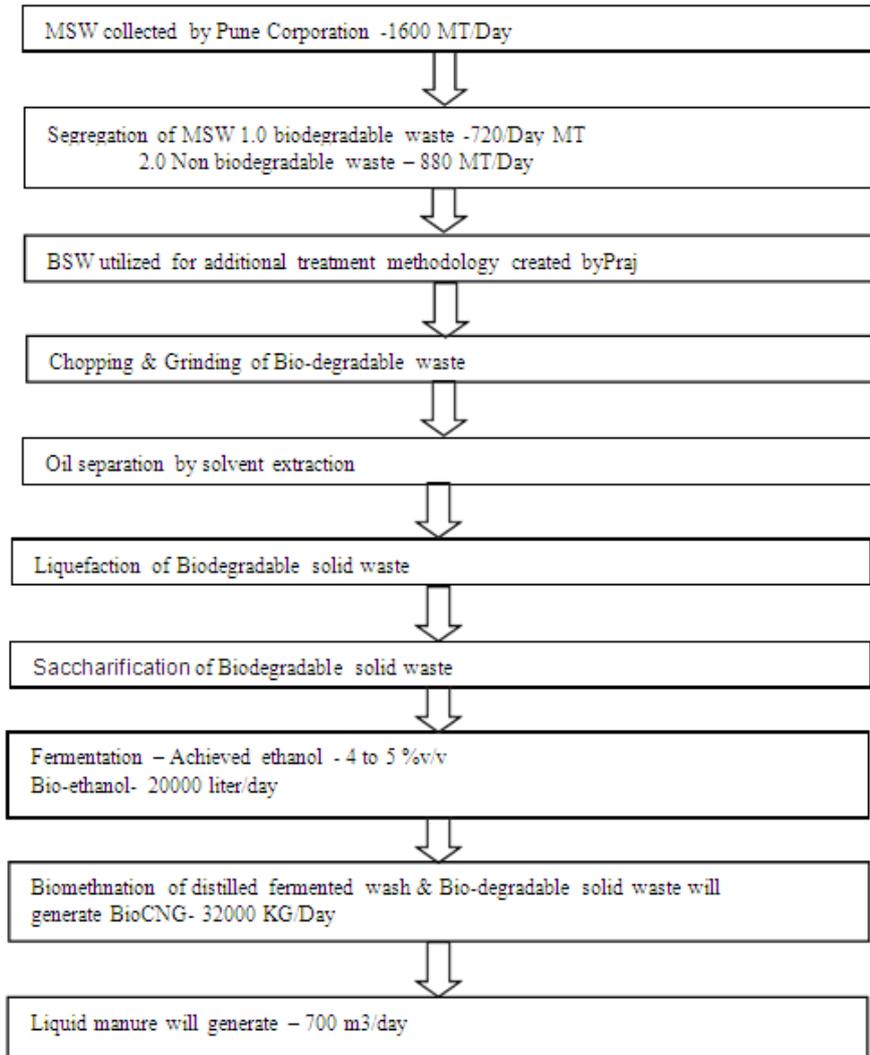


Fig. 5. MSW from housing societies

2.2. “Praj” Technological Developments

“Best from waste” no more has remained state for the purpose and has become reality. Huge loads of strong waste produced each day in towns, towns, urban areas and megacities. Praj accepts that the waste is not any more legitimate term and should be named as crude material/feed stock and can be changed over in to esteem added items. Broad work has been under taken at Praj Matrix-the R&D focus to investigate the recipient significance of strong waste.

2.2.1. MSW composition

Prior to beginning any work, it is generally imperative to comprehend the crude material and its structure. No of tests were gathered from various districts of city trash assortment and investigated (Table 1.0)

Table 1. Composition of MSW

Sample No.	Total Solids (%w/w)	TVS (%w/w)	COD ppm	BOD ppm	Starch (%w/w)	Free sugar (%w/w)	Carbohydrates (%w/w)
1	27.45	26.85	383333	192867	5.76	2.25	0.39
2	20.94	18.66	345000	211203	4.27	2.68	0.59
3	23.03	22.06	530000	278509	5.22	3.6	1.42
4	21.35	19.51	343333	189156	4.09	1.06	0.66
5	21.30	20.50	260000	145242	5.67	1.79	ND

Based on the region, compositional properties were changed. Essentially as table1.0 shows high BOD, COD and absolute unstable substances (TVS) . Barely any examples indicated fat substance 2 to 4 % w/w and protein content additionally went 2 to 4% w/w. Free sugar, starch and carbs (cellulose and hemicellulose) aggregately ran 9 to 10 % v/v. Remembering those qualities, the trials were directed. High unpredictable natural strong with high BOD and COD qualities demonstrate colossal potential for Bioethanation Composite Sugar focus 9 to 10 % is satisfactory to deliver ethanol. Nitrogen content is sufficient subsequently of strengthening nitrogen may not be needed. Oil can be isolated from strong waste and used to make biodiesel.

2.2.2. Experimental setup to produce ethanol by fermentation

In the wake of considering piece of different examples try was done as follows by taking 5 kg kitchen waste bunches.

- Physicochemical and warm pre-treatment to make material stream capable and defenseless to enzymatic treatment.
- Separation of oil by centrifugation
- Enzymatic treatment to convert poly saccharides in to simple sugars
- Beginning yeast cell focus was 150 to160 M cell/ml utilizing accessible dynamic dry yeast in market
- Aging was done in 5 lit working volume disturbed vessel
- Temperature was maintained to 32 deg C.
- Results were confirmed with 5 repetitions



Fig. 6. MSW mixed from different localities.

2.2.3. Observation & results

➤ Maturation home time took 24 to 28 hr. to accomplish ethanol fixation around 4 to 5 % v/v The ethanol yield was 48 to 52 lit/MT of strong waste.

2.2.4. Interpretation of Results

➤ The strong waste example taken for aging investigation was mostly from the region where lodgings and cafés were prevalent showing waste was Kitchen waste.
 ➤ That is to say, ethanol maturation should be possible from the strong waste that has isolated as kitchen squander.

2.2.5 .Overall MSW management model

- Segregation of MSW in to biodegradable and non-biodegradable waste.
- Non-biodegradable waste is reused, land filled or consumed
- Kitchen waste and Non kitchen biodegradable waste
- Biodiesel production

From kitchen waste, utilizing actual treatment, waste cooking oil is isolated out. This cooking oil is handled to get biodiesel.

➤ **Ethanol production**

In the wake of isolating out oil, rest is aged utilizing yeast and ethanol is created. From aged squash hydrous ethanol is refined out. Hydrous liquor is ethanol having around 95 % v/v ethanol fixation. It is got dried out by eliminating dampness utilizing atomic sifter lack of hydration and utilized as fuel ethanol (for mixing in gas)

➤ **Bioethanation**

Spent wash produced subsequent to refining out hydrous ethanol is blended in with non-kitchen biodegradable waste and Bio-methanation is done. Biogas created by Bioethanation has around 55 % methane. After Bioethanation, over stream from bio digester is utilized as fluid fertilizer.

The biogas is used as

- 1) boiler fuel to generate steam.
- 2) generate electricity by removing traces of H₂S gas
- 3) convert in to CNG gas and use as engine fuel.

III. CONCLUSIONS

As opposed to looking strong waste as waste ,it tought to be looked as Source of fuel. Whenever oversaw appropriately, we can see that, biodegradable waste gives, biodiesel, Bio CNC, Fuel ethanol and fluid excrement. There is no left over waste. From non-biodegradables, after recyclable material, rest goes to cremation or land filling. Significant test is assortment legitimate isolation and transportation. Praj has taken up the waste administration as one of the significant ventures and accomplished innovative edge that will demonstrate the "Waste" is not any more waste however is the significant asset and can assume significant part in satisfying energy necessity of humankind.

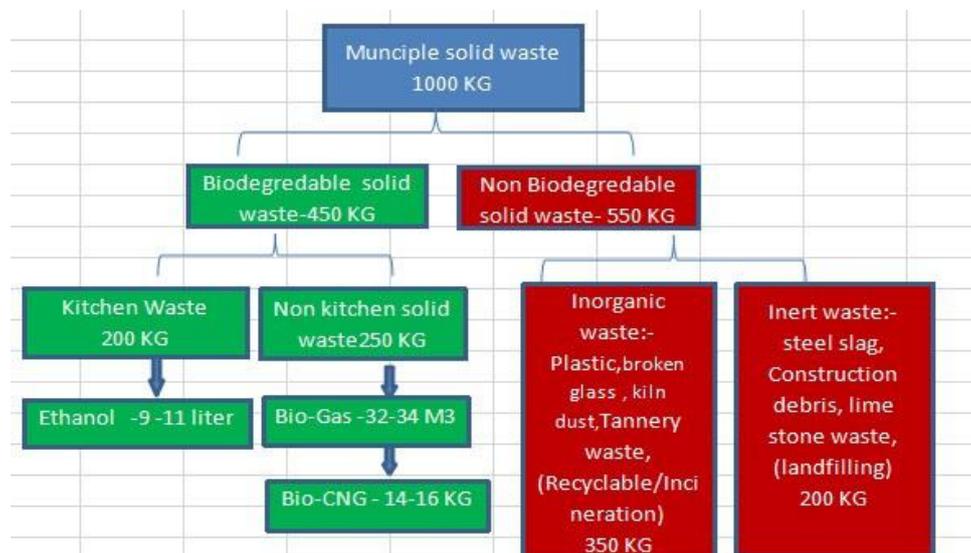


Fig. 7.

REFERENCES

- [1]. Choi, I. S., Y.G. Lee, S. K. Khanal, B. J. Park and H.-J. Bae (2015).
- [2]. Kim, J. H., Lee, J. C., & Pak, D. (2011). Feasibility of producing ethanol from food waste. *Waste management*, 31(9), 2121-2125.
- [3]. Cekmecelioglu, D. and O. N. Uncu (2013).