

STUDY ON VARIOUS BIO-MEDICAL WASTE USING TGA

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Abstract: As the population of India increases day by day there is huge demand in bio-medical waste disposal. So, government of India finding difficult to handle bio-medical waste. We proposing an idea to use biomass to convert into useful product in order to maintain waste management. by using thermos gravimetric analysis to determine the decomposition temperature and also which help to conclude that it can convert into useful product.

Index term: Biomass, waste management, medical waste, TGA.

I. INTRODUCTION

The modern India finding difficult in handling of bio-medical. The waste management of medical waste is not treated properly, may be hazardous to people and environment. As the incineration of medical waste is not developed in India, it is necessary to know the products during incineration and others process. According to Bio-medical waste management rule in 2016, the medical waste categories in four bags yellow, red, blue and white colour bags. From these categories red colour bag was selected under survey in hospital. The two samples have selected glucose bottle and glove. Medical incineration plant refers not just to the mass burn, but also to type of thermal treatment systems for discarded materials that waste resources and generate pollutants. These include systems based upon combustion, pyrolysis, and thermal gasification.

In biomass conversion method combustions process due to the tremendous diversity of medical waste sources. It is important to build comprehensive medical waste models that can predict product specification and yields. The lack of data, combining with the large variety and complexity of medical wastes. Medical waste characteristics can be clarified for conversion method of each medical waste is studied.

II .Thermo-Gravimetric Analysis

In thermogravimetric analysis, the change in weight in relation to a change in temperature in a controlled environment is measured. Heat is used in TGA to force reactions and physical changes in materials. Thermogravimetric analysis (TGA) is a reliable method to determine endotherms, exotherms, measure oxidation processes, thermal stability, decomposition points of explosives, characteristics of polymers, solvent residues, the level of organic and inorganic components of a mixture, degradation temperatures of a material, and the absorbed moisture content of materials. Materials analyzed by thermogravimetric analysis include explosives, petroleum, chemicals, biological samples, polymers, composites, plastics, adhesives, coatings, organic materials, and pharmaceuticals. The thermogravimetric analysis instrument usually consists of a high-precision balance and sample pan. The pan holds the sample material and is located in a furnace or oven that is heated or cooled during the experiment. A thermocouple is used to accurately control and measure the temperature within the oven. The mass of the sample is constantly monitored during the analysis. An inert or reactive gas may be used to purge and control the environment. The analysis is performed by gradually raising the temperature and plotting the substances weight against temperature. A computer is utilized to control the instrument and to process the output curves (temperature vs. weight).

III .Experimental material

The experimental material according to survey in hospital as shown in table 1 and 2. The red colour bag is selected for sample for analysis

Table 3.1: Total amount of waste for 6 days

BAGS	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
YELLOW	40Kg	38Kg	40Kg	41Kg	40Kg	46Kg
RED	10Kg	10Kg	12Kg	12Kg	8Kg	11Kg
BLUE	3Kg	2Kg	3Kg	3Kg	2Kg	2Kg
WHITE	2Kg	1Kg	1Kg	1Kg	3Kg	3Kg

From survey, we selected red colour bag for sample materials. Material found in red colour bag:

- Glucose bottles
- Syringe
- Tubes
- Gloves and other plastics

Table 3.2: total amount of waste weight for year

MATERIALS	DAY Kg	MONTH Kg	YEAR Kg
GLUCOSE BOTTLE	4	120	1460
SYRINGE	3	90	1095
TUBES	1.5	45	547.5
GLOVES AND OTHERS	1.5	45	547.5
TOTAL	10	300	3650

3.1 Survey Conclusion

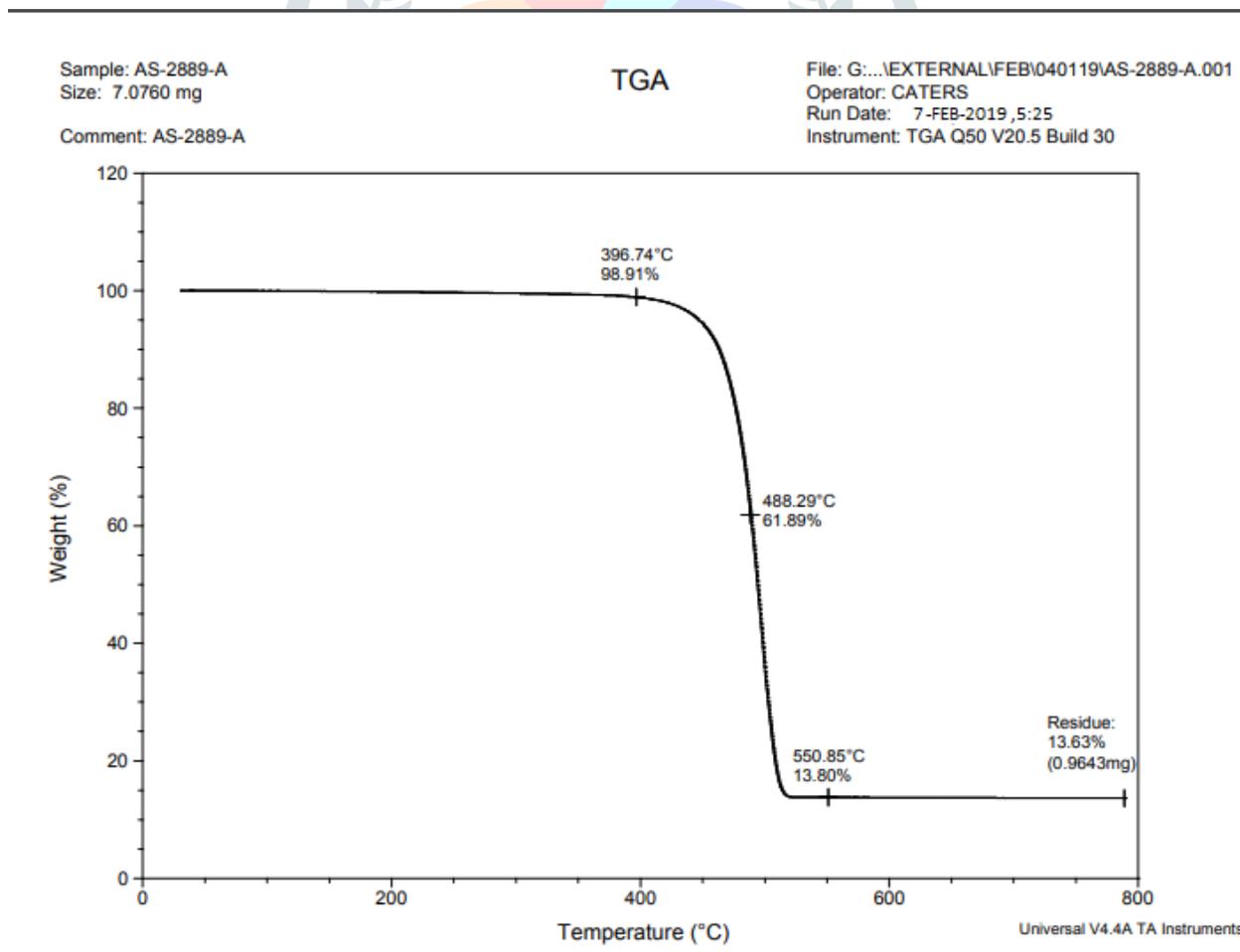
We conclude that two sample material selected for doing TGA analysis.

- Glucose bottle
- Gloves

IV .TGA Graph

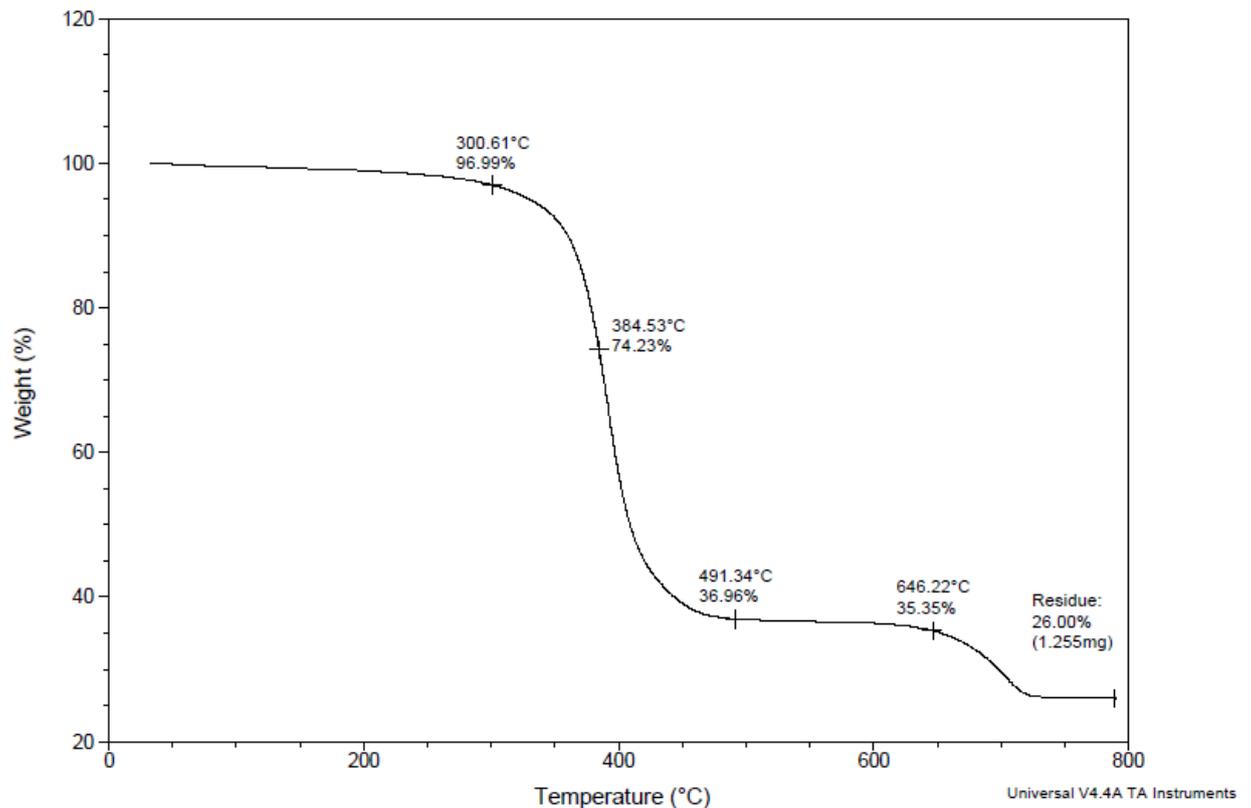
The TG analysis of glucose bottle and glove as given below:

Graph4.1: TGA for glucose bottle and glove



As shown in graph4.1, the weight of glucose bottle start to decompose at 300°C. It lose nearly 25% of weight at 350°C. So, between 400 to700°C material completely lose is weight for 70% and attain the char state. After 600°C bottle completely turns into ash state.so, the temperature of decomposing the bottle is around 350°C.

Graph4.2: TGA for glove



As shown in graph 4.2, the weight of gloves start to decompose at 300°C. It lose nearly 25% of weight at 384°C. So, between 400 to700°C material completely lose is weight for 70% and attain the char state. After 600°C bottle completely turns into ash state.so, the temperature of decomposing the bottle is around 350°C.

V .Conclusion

The two bio-medical waste of glove and glucose bottle has been analyzed using Thermo-gravimetric analysis for to determine the decomposing temperature. As the result of analysis shows that both samples has completely burndown into at 600°C. The temperature is more suitable for doing pyrolysis. So, the sample can be useful for pyrolysis process converting into bio fuel. By this way waste management is efficiently utilized and environment can be protected from hazards waste.

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