

STUDY ON VARIOUS BIO-MEDICAL WASTE USING FTIR ANALYSIS

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Abstract – As the Population of increases day by day the government of India facing problem in power demand. To overcome the power demand, we propose an idea of Bio-medical waste management. Using Biomass, waste can convert into useful power source. By using Fourier Infra-red analysis, we can able to get the chemical composition and also we can easily able to conclude the biomass which yield much useful bio product from waste.

Keyword- Biomass, waste management, medical waste, FTIR.

1. Introduction

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.

1.1 FTIR analysis

Fourier transform infrared spectrometry (short FT-IR) is one of techniques that are used today for measuring the intensity of infrared radiation as a function of frequency or wavelength. Infrared radiation is invisible electromagnetic radiation just below the red colour of visible electromagnetic spectrum, with wavelength range from 700 nm to 1mm. FTIR results can be used to evaluate the functional groups and prove the existence of some emissions, which provides plenty of information of mixed gases, can be used to identify the composition of mixture, as well as be used to quantify CO₂, CO, CH₂, C₂H₄, HCN, and NH₂, etc.

Table 1

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

1.2 Experiments materials

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

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 2

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

1.3 Survey Conclusion

We conclude that two sample materials selected for doing FTIR analysis.

- Glucose
- Gloves

2. Result of FTIR

When the absorbance at different wavenumber can be obtained to analyse the composition of gas at this moment; at the same time, when the wavenumber is fixed absorbance information at different time can also be obtained. This wave number to analyse certain component as a function of time. The FTIR result of a bottle shows many peaks of different value in concern with transmittance (%) and (cm⁻¹). Despite of many micro peaks there is a smooth stretch between the values of 3370.6 and 2416.1. The smooth stretch shows the traces of alkenes. Some small sharp and blunt peaks are also absorbed between the values of 2340.4 and 1720.9. It shows the presence of carboxylic acids esters. The largest peaks has the value of 714.2. It implies the presence of alkyl group.

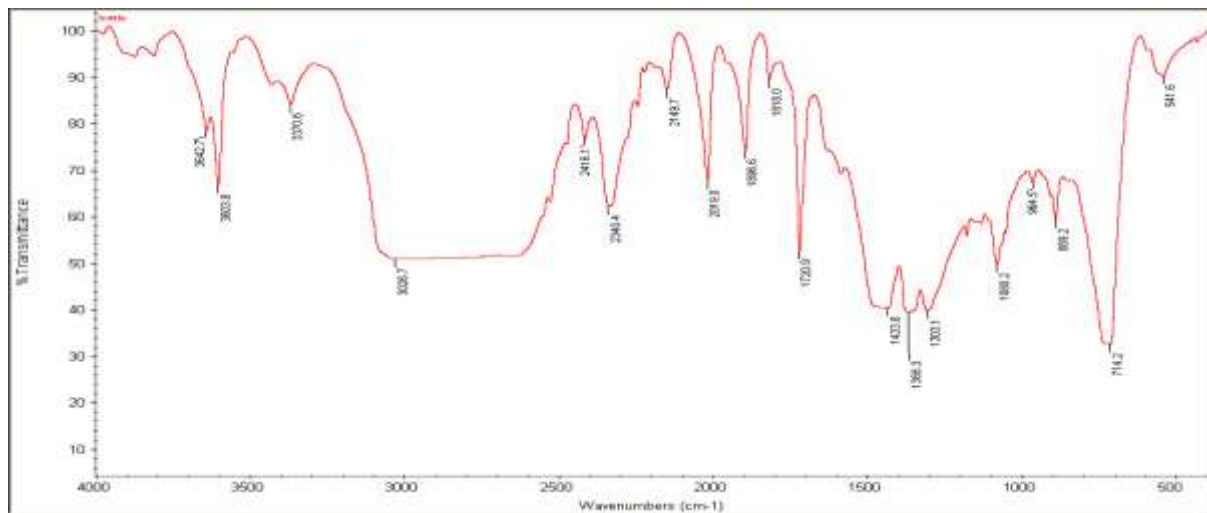


Fig.3.1 (a) FTIR result of bottle

The FTIR result of gloves shows many peaks of different values in concern with transmittance (%) and (cm⁻¹). In concern with the gloves results of FTIR there are two flat regions. They are 3020 and 1735. It implies the presence of alkyl halides and anhydrides. Huge number of tiny peaks is also absorbed. It shows the presence of many combinations of compounds. It assures the presence of Nitriles, Amines and Amides.

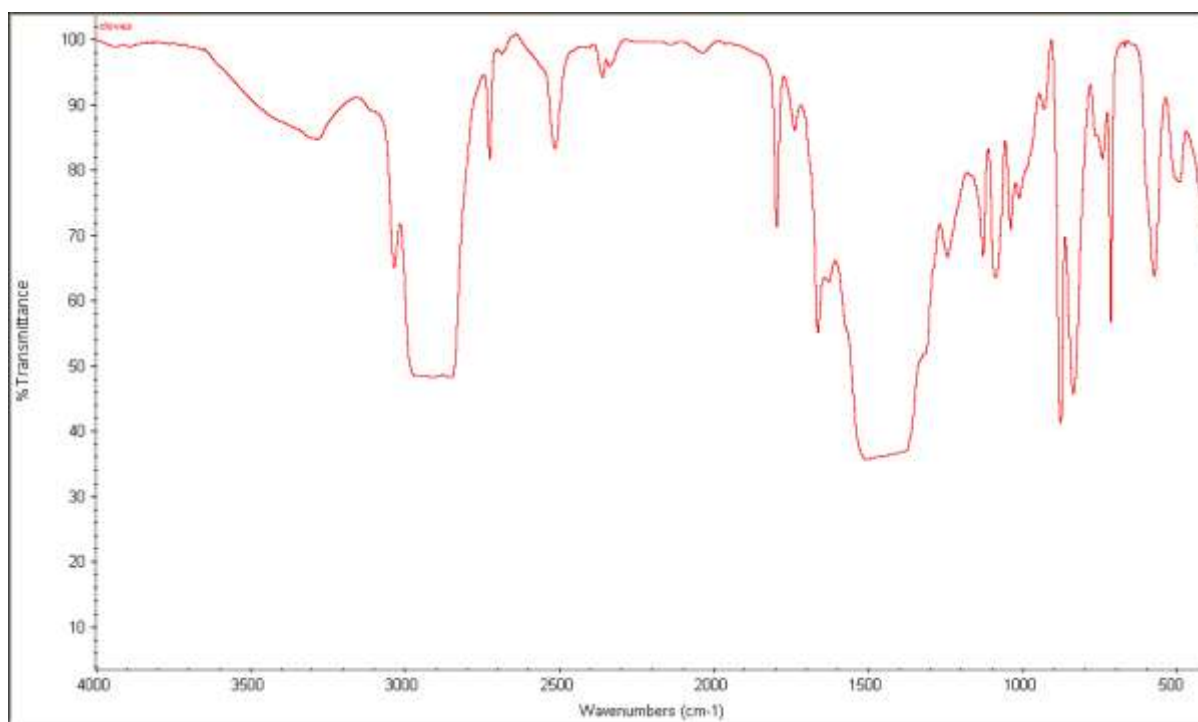


Fig.3.1 (b) FTIR result of gloves

3. Conclusion

The two medical wastes bottle and gloves contains esters, alkyl halides, anhydrides, nitrites, amines, amides and carboxylic acids. These can be used to produce multiple by products. Amines such as Novocaine are commonly used as anaesthetics, ephedra used as decongestant. Primary aromatic amines are used as a starting material for the manufacture of azo dyes. Nitrile rubber is a synthetic copolymer of acrylonitrile and butadiene. This form of rubber is highly resistant to chemicals and is used to make protective gloves, hoses and seals.

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