

# The Use of Biodegradable Plastics as the Best Substitute for Petrochemical Plastics

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## Introduction

- This project was done to study and investigate the significance of using biodegradable alternatives to replace conventional plastics.
- A number of places around the city of Arusha, including the Ilboru high school compound and a few places in the city of Dar-es-salaam were visited to observe the need for replacement of conventional plastics.
- A study was done to observe the extent to which plastics are used around the world.
- All the collected data was further analyzed and represented statistically.
- The resulting conclusion drawn from the process was that, there is a great need for a more virtuous material to replace plastic due to its negative impacts both ecologically and anatomically. This resulted to the idea of replacing conventional plastics with bio-plastic which can be made from renewable materials and be of more advantage.

## Procedure

When banana peels are used;

- Banana peels
- Blender
- Heat source
- Hydrochloric acid
- Sodium hydroxide solution
- When tapioca starch is used;
- Tapioca starch
- Vinegar
- Glycerin
- Heat source
- Water
- Aluminum foil

## Method

### For banana peels;

1. Washing of ripe banana peels using clean water.
2. Cutting/slicing of washed banana peels.
3. Grinding of sliced banana peels till liquid paste is formed.
4. Heating liquid paste up to about 150°C.
5. Separating the mixture contents by a separating funnel.
6. Adding HCL (100 ml /50g sample) and letting hydrolysis process go for about 8 hours.

### For tapioca starch;

1. Putting 1 tablespoon of starch into beaker
2. Putting 1 teaspoon of vinegar
3. Stirring the mixture formed in a beaker and heating until a thick, fine milky solution is formed and the paste starts bubbling.



A beach at the outskirts of the city of Dar-es-salaam.

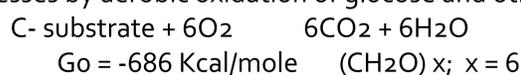


The Muriett landfill site at Arusha city.

## Results

### MEASUREMENT OF BIODEGRADABILITY.

Micro-organisms use the carbon substrates to extract chemical energy that drives their life processes by aerobic oxidation of glucose and other readily usable C-substrates.



Thus a measure of the rate and amount of CO<sub>2</sub> evolved in the process is a direct measure of the amount and rate of microbial use (biodegradation) of the C-polymer. This forms the basis for various international standards for biodegradability or microbial use of the test polymer/plastic. The rate and extent of biodegradation or microbial use of the test polymer/plastic.

Date	ingredients	observations
10 <sup>th</sup> feb2019	Fresh banana peels +HCL(200ml) +NaOH(200ml)	Null
18 <sup>th</sup> feb2019	Cassava starch +vinegar+ glycerol	Final plastic is too soft and brittle (cracked after 2 days)
22 <sup>th</sup> feb2019	Lab starch +vinegar +glycerol	Strong, translucent material which fits to be used as plastic

## Conclusions

For the research that we did (documented above and non-documented) we decide to make a bioplastic material as a sign that plastics can be replaced by something far less harmful and more natural if efforts are put to overcome the challenges on the subject matters.

Biodegradable polymers will play a greater role in the future. Post-use bio-degradable plastics and other bio-wastes like papers, food and garden waste are generally unsuitable for landfills due to their potential to release methane under aerobic conditions.

By using these biological treatment methods, the total quantities of waste sent to landfills are reduced and the composts generated can be used as valuable soil improvers. Bioplastic polymers have a great potential to contribute to material recovery, reduction of landfill and use of renewable resources, widespread public awareness of these materials and effective infrastructure for stringent control of certification, collection, separation and composting will be crucial to obtaining these benefits in full.

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