Project Synopsis

“Recycling and Conversion of Waste PET Bottles into Acrylic Paints”

Submitted in partial fulfillment of the requirements for the award of the degree

BACHELOR OF ENGINEERING
in
MECHANICAL ENGINEERING

By
Rajath R 4SO15ME085
Pavan Kumar 4SO15ME077
Manish S Shetty 4SO15ME065
Prajwal 4SO15ME079

Under the guidance of

Mr. Vinoothan Kaliveer
Assistant Professor
Department of Mechanical Engineering

ST JOSEPH ENGINEERING COLLEGE
MANGALURU 575028
2018-2019
ABSTRACT

In this present work of Recycling of waste PET bottles, waste Polyethylene Terephthalate (PET) Bottles have been collected from local waste dumping areas in order to reduce the increasing trend in consuming plastic wastes (plastic pollution) which adversely affects wildlife and humans. These waste PET bottles will be then processed (segregating and cleaning) and converted (cutting) to fine plastic flakes. By glycolysis and hydrolysis process some part of plastic flakes are converted to binders with the addition of propylene glycol and zinc acetate. Remaining plastic flakes are subjected to hydrolysis and converted to suitable solvents. These solvent and binder in a certain proportion will lead to a chemical reaction to form a low volatile acrylic paint which can be used for commercial purpose.

Keywords: Recycling, waste PET bottles, hydrolysis, glycolysis, Acrylic paints.
INTRODUCTION

Plastics are responsible for countless facets of the modern life we enjoy today from health and wellbeing, nutrition, shelter and transportation to safety and security, communication, leisure activities and innovations of industry. Plastics improve our lives; bring us joy, convenience, efficiency and connection to others. Sometimes these materials even save our lives. In short, plastics’ flexibility and adaptability enable them to provide many different solutions in an increasingly complex world. But they are few problems that need to be considered due to use of plastics in our day to day life.

Once discarded, plastic materials can take centuries to break down. They clog up landfills and overburden waste-processing facilities. By turning bottles, packaging and other plastic refuse into new goods, recycling helps the environment and creates new economic opportunities. Plastics recycling keeps still-useful materials out of landfills and encourages businesses to develop new and innovative products made from them. Plastic goods are useful because they are durable, but this becomes a disadvantage when items are discarded. The natural processes that degrade many paper, cardboard and wood products in a few months don’t affect plastic materials as much. In landfills, plastics accumulate, creating a volume of refuse that never seems to go away. In nature, plastic bits and pieces become unsightly nuisances and hazards to animals. Diverting discarded plastics from the refuse stream and turning them into new goods keeps these persistent materials out of landfills and the natural environment. The use of recycled plastics in products requires creative thinking on the part of designers, technicians and manufacturers. This project is mainly based on recycling of waste PET bottles and converting them to Acrylic paints.

Paint is used generally to protect or to provide texture to objects. Pigment, binder, additives and liquid are four main components of paint. Here in this project we are obtaining binders and solvents from the waste PET bottles.
OBJECTIVE

- To promote the use of recycled plastics thereby reducing the wastage of non-biodegradable plastics.

- To convert waste PET bottles into paints of low volatile organic compounds.
METHODOLOGY

Manufacturing of paints contains 4 main components which are pigments, additives, solvent and binders.

- Pigments and additives are selected based on colour and Properties.
- Solvent and binders are obtained from the recycling of PET.
- PET bottles are made to small flakes. Two processes are performed on these flakes which are acid hydrolysis and glycolysis to obtain Solvent and Binder.

Acid Hydrolysis:
(Distillation and Filtration)
A part of the flakes is taken, the reaction between PET flakes, concentrated Sulphuric acid, sodium hydroxide and calcium hydroxide will take place under the temperature condition raging from 363K-373K. After Filtration ethylene glycol is obtained, which is used as a solvent.

Glycolysis:
(Distillation and Filtration)
A part of the flakes is taken. The reaction will take place between PET flakes, Propylene Glycol and Zinc Acetate under temperature conditions ranging from 443K-453K. The product obtained is filtered to obtain oligomers (Viscous oil), Which is used as binders.

Pigment:
Titanium Di-oxide-White colour