OPEN HOUSE

Department of Chemical Engineering

2014 IIT DELHI OPEN HOUSE

Starch based Bio-Degradable Plastic

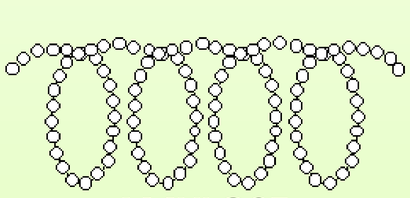
About the project:

This project is our sincere effort towards providing an environment friendly substitute for non-biodegradable low density plastic (LDP) used heavily in our daily life. We have developed a biodegradable plastic using corn starch, water, glycerin and vinegar.

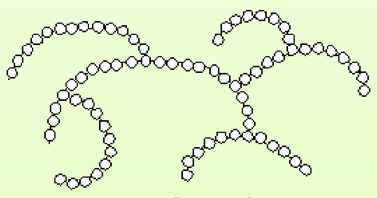
Science behind it

HOW SOMETHING LIKE STARCH IS TRANSFORMED INTO A POLYMER?

Starch has two main constituents:-



AMYLOSE
(straight chained)



AMYLOPECTIN
(branched)

- For a good flexible plastic we only need amylose. In order to remove the branched part, we add a weak acid in our case acetic acid (vinegar).
- Under acidic conditions and with the application of heat amylopectin breaks into straight chains (dextrin).
- Glycerine is added as a plasticizer to increase the fluidity i.e. it prevents it from becoming brittle.

Possible Applications



Agriculture

- Mulching Films (Plastic Mulch)
  The removal of plastic mulch contributes to a higher cost that can be avoided using biodegradable plastic films.



Disposable Good

- Catering items
  e.g. crockery, cutlery, pots, bowls, straws
- Packaging
  It is estimated that 41% of plastics are used in packaging, half of that volume is used to package food products
  e.g. Shopping Bags, Bin Liners, Garbage Bags, T-shirt Bags



Medical Implants

- Currently implants made of Polylactic Acid(PLA), which dissolve in the body, save patients a second operation

Comparative Analysis

Property	LDPE	Bio-polymer film	Cotton Gauze	Composite
Max. Load (Kg.F)	1.73	1.65	4.5	10
Max. Extension (mm.)	278	17	7.5	7.5
Cost (Rs./Kg)	80	72*	100	172*

* These costs do not include overheads like labour cost, machinery and energy
** All tests were done with a sample of length 10cm. and width 1In. on a Instron machine



Plain Bio-Polymer Film



Composite
(Polymer + Cotton gauze)

Project made under the guidance of **Prof. Sanat Mohanty**

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