



Hackathon: the circular diaper

Team 4 - Go Green



HACKATHON: THE CIRCULAR DIAPER

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The context:



- It takes more than **500 years** to decompose
- **Waste of raw materials** especially SAP (most expensive component of diapers)
- **Quality** of diaper's components (= future raw materials) can be **compromised** if the diapers are not collected properly
- Contain various **harmful substances** such as Dioxins, Tributyltin and many more volatile organic compounds.

Our analysis by steps:



COLLECTION

BOTH AT THE
SUPERMARKETS AND
LOCAL COUNCILS



RECYCLING

PE, CELLULOSE, SAP



PRODUCTION

PLASTIC BAGS, TRASH
CANS, ADHESIVE

PROBLEMS:

- **Not** economically sustainable
 - Capital intensive
- Managing **small volumes**
 - Hard to justify it's cloning to other locations

SOLUTIONS:

- Recycling **“better”**
 - Recycling more of the diaper through new systems
- **“Internalizing”** the process
 - From collecting to washing and recycling, **we do it all**

How to collect diapers?

The regions that we consider are Bavaria and Baden-Wuttemberg: The collection model would take the help of local councils to ensure timely and effective collection of soiled diapers.

- **Local Councils**

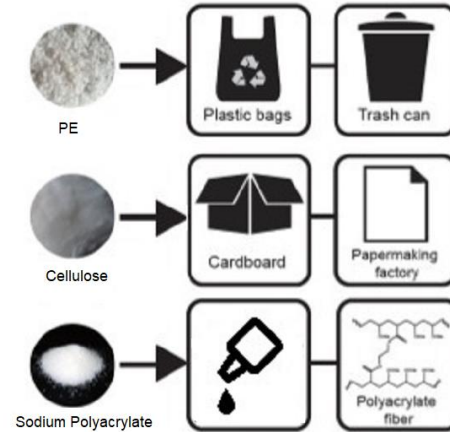
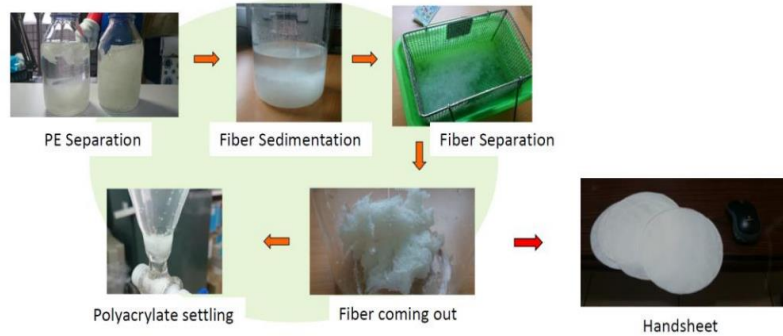
Agreement with local administration concerning the collection of soiled diapers from **households, old-age homes, hospitals and nursing homes ensuring better collection and reduction of diapers** ending up in landfills/incinerators. Process can be done through **colored garbage bags** that are given out for diapers and which are later separated.

- **Collection points**

Collection points should be located next to supermarkets(eg:-Lidl). The **customer** scans the QR code on the bins before throwing the waste and gets **2% discount on their next purchase.** **Every 3 days, the local council would go and collect the trash and send it to the recycling centre.**



Our ideas to recycle diapers



The process devised by US scientists to move from a network of absorbent polymers to adhesive polymers predict three stages.

1- **Break the network of absorbent polymers** in such a way as to obtain water-soluble chains.

2- **Shorten the polymer chains** thus obtained **through sonication with tiny air bubbles** which, when exploding, break the chains while leaving the bricks that constitute them intact.

3- Finally, to make the adhesive chains, another chemical step with a **solvent must be used (which can be reused) which converts the acid groups of polymers into ester groups.**

Financial information

- Basic expenses
 - Fixed costs (\$20 million)
- Logistics costs
 - E.g. Trucks
- Commercial Partners
 - Pickup & Delivery (\$10 million a year)
- Profits
 - Per ton, various activities
 - **\$21,600/month/ton**



Sources

ACADEMIC REFERENCES:

- 1- Research paper: Recent technologies for treatment and recycling of used disposable baby diapers
- 2- Stefan Tkac, Sz-Chwuan John Hwang ,”Sustainable used diaper recycler “
- 3- “ Giving superabsorbent polymers a second life as pressure-sensitive adhesives”

WEB REFERENCES:

- 1-<https://eandt.theiet.org/content/articles/2021/07/superabsorbent-nappy-polymers-could-be-recycled-into-stationery/>
- 2- <https://www.unicharm.co.jp/en/csr-eco/education/note-02.html>