Bioplastics

Bio-base and biodegradable plastics

Jonathon Marks

The problem with plastic

- Years to decompose
- Huge amount is produced
  - 400 million tonnes of plastic is produced each year and <u>40% is single use</u>
- 8 million tons ends up in our ocean
- 100,000 animals in the ocean are killed each year

Styrofoam Cup 50years

Nappies 450 years

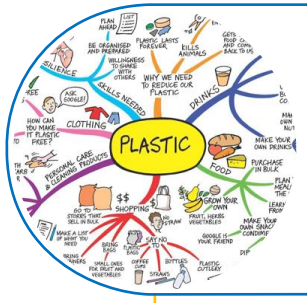
Plastic bottle 450 years

Fishing line 600 years

Why bioplastics?

- Plastic has a lot of desirable qualities
- Decomposes in months not years
- Can be made using various plant bases
- Compostable
- Carbon-neutral

What's involved



Base knowledge

Advantages and disadvantages
Properties
Litter surveys (and pick) beach and local
Items made of it
Single use item

Make bioplastics

IDL - Science
Potato based, milk based
Harvest (some) potatoes from school garden

Testing in different environments
Hypothesis

Decomposition Test

Material properties testing

Replicating existing products
Manufacturing processes
Comparative testing, strength,
Flexibility, durability, stiffness..

Analyse results
Success/failure?
Next steps?
Alternative materials?

Review Results

Design Iteration

Design out weakness
Make improvements
Retest

Unit Aim

- Identify and analyse material properties
- Analyse the environmental impact of materials and products on the environment
- Investigate how products can be made more sustainable

Main Experiences and Outcomes

- TCH 4-10a - I consider the material performance as well as sustainability of materials and apply these to real world tasks.

- TCH 4-09a - I can apply design thinking skills when designing and manufacturing models/products which satisfy the user or client.

- SCN 4-16a - I have carried out research into novel materials and can begin to explain the scientific basis of their properties and discuss the possible impacts they may have on society.

Make your own bioplastic

- 1 tsp vegetable glycerin (available at the pharmacy)
- 1tbsp corn, potato or other starch
- 1 tsp vinegar (5% acidity)
- 4 tbsp water

- Mix on medium heat. Stir continuously. The mixture should turn from a liquid white mixture to a clear gel consistency. When it begins to bubble it is done, remove from heat immediately to prevent burning.
- Pour on to tray, leave for 1 hour and form material

Bibliography

- https://www.wikihow.com/Make-Potato-Starch
- https://www.instructables.com/id/Make-Potato-Plastic!/
- https://www.bbc.co.uk/news/world-europe-45965605