C6.1.5 (Combined Science)

C6.1.15 (Triple Chemistry)

Choosing Materials

Previous Learning C2.2.7 Polymer molecules

A **polymer** is a substance whose molecule is made from many repeating units

Knowledge recap quiz

Learning Objectives

- Describe what a life cycle assessment is
- Explain how the properties of materials link to their uses
- Evaluate data from a life cycle assessment to choose a product for a particular use

Choosing a material

I want to make a cup to hold my hot drink whilst I'm on duty in the playground – which one of these materials should I use and why?

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PET	1.20	78	254	70
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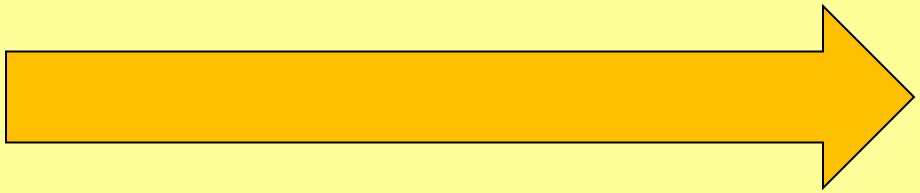
Cradle to Grave - what are the stages in a person's life?



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How is this similar to a manufactured product?

What is a life-cycle assessment?

A life-cycle assessment looks at the impact of an object through its life

This means from the time it is made (**cradle**), to the time it is disposed of (**grave**)

Cradle
Raw materials
Energy
Water

Use
Energy use
Energy for maintenance
Chemicals for maintenance

Grave
Energy for disposal
Space for disposal

What's the point of Life Cycle Assessments?

Comparing different materials for the same job e.g. wood vs PVC for windows

Comparing the same material for different jobs e.g. PVC for cling film vs PVC for buckets

Seeing which stage has the biggest environmental impact. This allows us to focus our efforts on reducing impact where it will have the biggest effect

TASK 1: Write these statements in the correct place in the table, then explain which is the best one and why

Can be washed and reused many times	Sand, limestone, ash	Recyclable (parts of) at end of life.	Raw material has to be stripped, treated, rolled etc.	Heavy, breakable - more fuel used to transport
Very high temperatures needed (energy use high) just to make the glass	Wood from trees, coated with a plastic (from crude oil)	Lightweight - less fuel used to transport	Single use	Fully recyclable at end of life. Water for cleaning

	Milk carton	**Glass milk bottle**
Extracting and processing raw materials		
Manufacturing and packaging		
Use and operation during its lifetime		
Disposal at the end of its useful life		
Transport and distribution		

TASK 2: Write these statements in the correct place in the table, then explain which is the best one and why

76% are reused (e.g. as bin liners) - this reduces environmental impact.	Landfill, composted or recycled	Crude oil or natural gas used to produce ethylene, which is then polymerised.	Production process uses a lot of water and causes water pollution. It also requires a lot of energy.	Tend not to be reused - this increases its overall environmental impact.
Transported by road from Europe. Heavy - 55 g per bag	Manufacture has environmental impact and uses a lot of energy.	Transported by sea and road from Far East. Lightweight - 8 g per bag	40 % to landfill 60% recycled	Wood, pulped and made into paper.

	Plastic carrier bag	Paper carrier bag
Extracting and processing raw materials		
Manufacturing and packaging		
Use and operation during its lifetime		
Disposal at the end of its useful life		
Transport and distribution		

What have you learnt today – answer the quiz questions