

1 – Resources and Recycling			
Natural resources	Form without human input. Include anything that comes from Earth, sea, or air .		
Synthetic replacements	Some natural products replaced by synthetic ones to be enhanced for our needs: - Rubber for tyres replaced by man-made polymers . - Cotton for clothing replaced by polyester . - Wood for construction replaced by PVC and MDF composites		
Finite resource	A resource that isn't replaced at a quick enough rate to be considered replaceable . (It will run out). E.g. fossil fuels .		
Renewable resource	A resource that can be made at the same or similar rate as it's being used. E.g. Solar power to make electricity.		
Sustainable development	Takes into account the needs of society while not damaging the lives of future generations.		
Recycling	Converting waste into a reusable material. Advantages: less energy required than making new products, less waste to landfill. Disadvantages: collection and transport requires organisation, workers, vehicles and fuel , it can be difficult to sort (e.g. different metals).		
2 – Life Cycle Assessments (LCAs)			
Stages of LCAs	1. Getting raw materials – extraction and processing 2. Manufacture and packaging – energy usage and waste 3. Using the product – damage to environment and lifespan 4. Product disposal – transport and pollution		
Plastic bag vs paper bag	Stage	Plastic	Paper
	1	Crude oil	Timber
	2	Fractional distillation , cracking, polymerisation. Waste has other uses.	Processed with lots of energy . Lots of waste .
	3	Can be reused (shopping, bin liner etc.)	Usually used once .
	4	Recyclable but not biodegradable .	Biodegradable , non-toxic, can be recycled .

3 – Alternative metal extraction (HT)	
Bioleaching	Certain bacteria can break down low grade ores to produce an acidic solution containing copper ions. The solution is called a leachate . Does not need high temperatures but produces toxic substances (H_2SO_4) which damage the environment . The leachate then needs processing to remove the metal.
Phytomining	Plants are grown on a low-grade ore . The plants absorb metal ions through roots and concentrate them in cells . Plants are harvested and burnt . Ash left behind contains metal compounds. It is slow but conserves limited supplies of ores and reduces mining .
4 – Potable water	
Potable water	Water that is safe for drinking . It is not pure water.
Treatment of freshwater	Freshwater must undergo filtration (to remove solids) and sterilisation to kill bacteria/microbes (using chlorine/ozone/UV).
Desalination	Removal of sodium chloride from seawater provides potable water. Used in very dry countries. Distillation or reverse osmosis .
Reverse Osmosis	Pressure is applied to solution where there is low concentration of water. Forces water flow from low concentration of water to a high concentration of water.
5 – Waste water treatment	
Screening	Removes any large solid materials such as twigs/plastic bags.
Sedimentation	Stands in sedimentation tank. Heavier solids sink to the bottom to produce sludge . Lighter effluent flows to top.
Effluent	Treated by biological aerobic digestion. Air is pumped through, bacteria break down organic matter.
Sludge	Anaerobic digestion breaks down organic matter in sludge . Methane gas released is used as energy source. Remaining waste used as fertiliser .

GSCE Science

Chemistry C10 – Using Resources