Beckfoot

Subject: Science (Chemistry)	Topic: using resources	Year Group: 10

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Finite and renewable resources

1	Finite resources	Can't be replaced as quickly as they are being used.
2	Example for finite	Fossil fuels and metals
3	Renewable resources	We can replace them as quickly as we use them. Will never run out
4	Examples for renewable	Wood,

Synthetic replacements

Common examples of synthetic replacements

1	Wool is replaced by acrylic fibres.
2	Cotton is replaced by polyester.
3	Wood for use in construction is replaced by PVC and MDF composites

Reuse and recycling

Importance of reuse and recycling and examples of materials reused and recycled

1	Help save limited resources and energy.
2	Reduce the amount of hazardous waste produced and less harmful effect on the environment. Quarrying causes habitat loss, noise pollution and release carbon dioxide.
3	Glass bottles can be reused- they can be crushed or melted to make different types of jars.
4	Plastic bottles are recycled to make fleece jackets and carpets.
5	Melt and recast metals into different products. The problem is different metals need to be separated before being recycled.

Potable water

Steps to obtain potable water

1	Choose a source of water
2	Remove solids such as dirt and mud
3	Remove bacteria and unwanted minerals such as salt.
4	Add chlorine to kill germs
5	Salt water must be desalinated to provide potable water. Distillation can be used to desalinate sea water. Sea water can also be treated by reverse osmosis, but this is expensive as it uses a lot of energy.

Treating waste water

Stages of sewage treatment

1	Screening and grit removal.
2	Sedimentation to produce sewage sludge and effluent.
3	Anaerobic digestion of sewage sludge – biogas produced/ remaining sludge can be used as fuel.
4	Aerobic biological treatment of effluent. Effluent can be discharged back into rivers.

Extraction of copper from low-grade copper ores (H)

1	Bioleaching	Bacteria is added to water from the lakes. Leach out copper from the bacteria.
2	Phytomining	Grow plants in copper containing soil. Plants absorb copper ions. Cut down plants and burn. Extract copper from the ash by electrolysis. The disadvantage of phytomining is plants grow slowly.

Key Vocabulary

1	finite	Will run out eventually
2	renewable	We can replace them as we use them
3	sustainable	generation without compromising the ability of the meets the needs of the current future generations to meet their needs.
4	Potable water	Water that is naturally safe for humans to drink
5	Life cycle assessment(LCA)	LCA is the environmental impact of a product.

Life cycle assessment

	Stages of a product's life	Impact on the environment
1	Extracting and processing raw materials	Large amount of energy required, causes pollution and damaging habitat through quarrying, mining or felling of trees.
2	Manufacturing and packaging	Use a large amount of energy and causes pollution. Use up land for factories. Releases harmful products.
3	Use of the product	It depends on the product- use a lot of energy, release toxic waste or damage the environment
4	Product disposal	Use up landfill sites. This takes up space and pollute land and water. Products might be burnt which could cause pollution.

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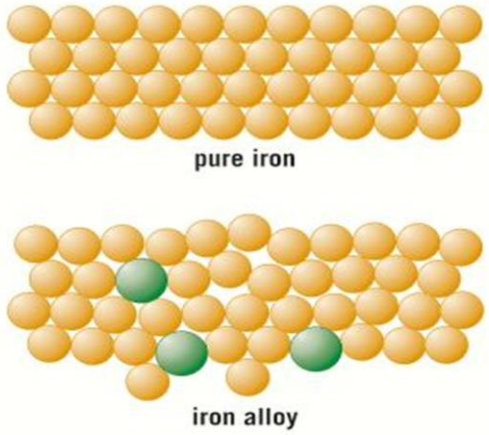
Corrosion

Iron + Oxygen + Water → Hydrated Iron (III)Oxide

How to protect metals from corrosion

1	Coatings- Grease, paint or electroplate
2	Natural coatings (Aluminium Oxide)
3	Sacrificial protections

Alloys



Ceramics

	ceramic	manufacture	properties	uses
1	Soda-lime glass	Heat a mixture of sand, sodium carbonate and limestone	Transparent and brittle	Everyday glass objects
2	Borosilicate glass	Heat sand and boron trioxide.	Higher melting point than soda lime glass	Oven glassware and test tubes.
3	Clay ceramics (pottery + bricks)	Shape wet clay then heat in a furnace	Hard, brittle, easy to shape before manufacture, and resistant to corrosion	Crockery, construction and plumbing fixtures.

Alloys- properties and use

	Alloy	composition	properties	use
1	bronze	Copper and tin	Resistant to corrosion	Statues, decorative items and ship propellers.
2	brass	Copper and zinc	Very hard but workable	Door fittings, taps and musical instruments.
3	Gold	Mostly gold with copper, silver and zinc.	Lustrous, corrosion resistant, hardness depends on carat.	Jewellery- 24 carat is 100% gold.
4	High carbon steel	Iron with 1-2% carbon.	Strong but brittle	Cutting tools and metal presses.
5	Low carbon steel	Iron with less than 1% carbon	Soft, easy to shape	Cars, machinery, ships, containers and structural steel
6	Stainless steel	Iron with chromium and nickel	Resistant to corrosion, hard	Cutlery and plumbing.
7	Aluminium	Over 300 available	Low density	Aircraft and military uses.

Composites

1	Composites are mixtures of material for specific uses.
2	The main material is called the matrix or binder.
3	Second material is added as threads or fragments.
4	Examples- concrete (cement and gravel), reinforced concrete(concrete and steel rods), plywood(thin sheets of wood and glue) and MFD(woodchips in polymer resin)

Haber Process

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

1	Nitrogen and Hydrogen are pumped through pipes.
2	Pressure of the gas mixture is increased to 200 atmospheres.
3	Pressurised gases are heated to 450°C and passed through a tank containing Iron catalyst
4	Reaction mixture is cooled, ammonia liquifies and then removed.
5	Unreacted Nitrogen and hydrogen are recycled.

NPK Fertilisers

1	**Nitrogen**- From Ammonia. Used to manufacture Ammonium salts and Nitric acid.
2	**Phosphorus**- Comes from mined phosphate rock. Treat the rock with nitric or sulfuric acid
3	**Potassium**- Potassium chloride and potassium sulphate. Common sources -Obtained by mining

NPK fertilisers provide plants with the essential elements for growth.