

USING RESOURCES

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<p>Humans use the Earth's resources to provide warmth, shelter, food and transport.</p> <p>Natural resources, supplemented by agriculture, provide food, timber, clothing and fuels.</p> <p>Finite resources from the Earth, oceans and atmosphere are processed to provide energy and materials.</p> <p>Chemistry plays an important role in improving agricultural and industrial processes to provide new products. It's also important in sustainable development, which is development that meets the needs of current generations without compromising the ability of future generations to meet their own needs.</p>	161	161	99	2
<p>Water of appropriate quality is essential for life. For humans, drinking water should have sufficiently low levels of dissolved salts and microbes. Water that is safe to drink is called potable water. Potable water is not pure water in the chemical sense because it contains dissolved substances.</p> <p>The methods used to produce potable water depend on available supplies of water and local conditions.</p> <p>In the UK, rain provides water with low levels of dissolved substances (fresh water) that collects in the ground, in lakes and rivers, and most potable water is produced by:</p> <ul style="list-style-type: none"> • choosing an appropriate source of fresh water • passing the water through filter beds • sterilising. <p>Sterilising agents used for potable water include chlorine, ozone or ultra-violet light.</p> <p>If supplies of fresh water are limited, desalination of salty water or sea water may be required. Desalination can be done by distillation or by processes that use membranes such as reverse osmosis. These processes require large amounts of energy.</p>	164-165	164-165	102-103	2

<p>Urban lifestyles and industrial processes produce large amounts of waste water that require treatment before being released into the environment. Sewage and agricultural waste water require removal of organic matter and harmful microbes. Industrial waste water may require removal of organic matter and harmful chemicals.</p> <p>Sewage treatment includes:</p> <ul style="list-style-type: none"> • screening and grit removal • sedimentation to produce sewage sludge and effluent • anaerobic digestion of sewage sludge • aerobic biological treatment of effluent. • 	164-165	164-165	102-103	2
<p>The Earth's resources of metal ores are limited.</p> <p>Copper ores are becoming scarce and new ways of extracting copper from low-grade ores include phytomining and bioleaching. These methods avoid traditional mining methods of digging, moving and disposing of large amounts of rock.</p> <p>Phytomining uses plants to absorb metal compounds. The plants are harvested and then burned to produce ash that contains metal compounds.</p> <p>Bioleaching uses bacteria to produce leachate solutions that contain metal compounds.</p> <p>The metal compounds can be processed to obtain the metal. For example, copper can be obtained from solutions of copper compounds by displacement using scrap iron or by electrolysis.</p>	161-162	161-162	100	2
Life cycle assessment and recycling				
<p>Life Cycle Assessments (LCAs) are carried out to assess the environmental impact of products in each of these stages:</p> <ul style="list-style-type: none"> • extracting and processing raw materials • manufacturing and packaging • use and operation during its lifetime • disposal at the end of its useful life, including transport and distribution at each stage. <p>Use of water, resources, energy sources and production of some wastes can be fairly easily quantified. Allocating numerical values to pollutant effects is less straightforward and requires value judgements, so LCA is not a purely objective process. Selective or abbreviated LCAs can be devised to evaluate a product but these can be misused to reach pre-determined conclusions, eg in support of claims for advertising purposes.</p>	163	163	101	2

<p>The reduction in use, reuse and recycling of materials by end users reduces the use of limited resources, energy consumption, waste and environmental impacts.</p> <p>Metals, glass, building materials, clay ceramics and most plastics are produced from limited raw materials. Much of the energy used in the processes comes from limited resources. Obtaining raw materials from the Earth by quarrying and mining causes environmental impacts.</p> <p>Some products, such as glass bottles, can be reused. Glass bottles can be crushed and melted to make different glass products. Other products cannot be reused and so are recycled for a different use</p> <p>Metals can be recycled by melting and recasting or reforming into different products. The amount of separation required for recycling depends on the material and the properties required of the final product. For example, some scrap steel can be added to iron from a blast furnace to reduce the amount of iron that needs to be extracted from iron ore.</p>	162	162	100	2
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