

# Chemistry Knowledge Organiser

## Using resources

1	Natural resource	Materials found naturally on the Earth that can be used to provide food, timber, clothing and fuels.
2	Finite resources	Also known as “Non-renewable”. Resources that will not be replenished in a human life-time.
4	Sustainable development	Development that meets the needs of current generations without compromising the ability of future generations to meet their own needs.
5	Potable water	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.
6	Pure water	Water that contains no other elements or compounds.
7	UK potable water	In the United Kingdom (UK), rain provides water with low levels of dissolved substances (fresh water) that collects in the ground and in lakes and rivers, and most potable water is produced by: <ul style="list-style-type: none"> <li>• choosing an appropriate source of fresh water</li> <li>• passing the water through filter beds</li> <li>• sterilising.</li> </ul>
8	Sterilising agents	Sterilising agents used for potable water include chlorine, ozone or ultraviolet light.
9	Desalination	Removing the salt from sea water to make it potable. Can be done by distillation or reverse osmosis – both processes require a lot of energy and so are expensive.
10	Sewage treatment	Sewage treatment includes: <ul style="list-style-type: none"> <li>• screening and grit removal</li> <li>• sedimentation to produce sewage sludge and effluent</li> <li>• anaerobic digestion of sewage sludge</li> <li>• aerobic biological treatment of effluent.</li> </ul>

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11	Phytomining	Phytomining uses plants to absorb metal compounds. The plants are harvested and then burned to produce ash that contains metal compounds.
12	Bioleaching	Bioleaching uses bacteria to produce leachate solutions that contain metal compounds. The metal compounds can be processed to obtain the metal.
13	Life cycle assessments	Life cycle assessments (LCAs) are carried out to assess the environmental impact of products in each of these stages: <ul style="list-style-type: none"><li>• extracting and processing raw materials</li><li>• manufacturing and packaging</li><li>• use and operation during its lifetime</li><li>• disposal at the end of its useful life, including transport and distribution at each stage.</li></ul>
14	Reuse	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.
15	Recycling metals	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.
16	Corrosion	Corrosion is the destruction of materials by chemical reactions with substances in the environment. Rusting is an example of corrosion.
17	Alloys	Most metals in everyday use are alloys. Alloys are created when metals are mixed (alloyed) with another element.  Bronze is an alloy of copper and tin. Brass is an alloy of copper and zinc.

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18	Gold alloys	Gold used as jewellery is usually an alloy with silver, copper and zinc. The proportion of gold in the alloy is measured in carats. 24 carat being 100% (pure gold), and 18 carat being 75% gold.
19	Steel alloys	Steels are alloys of iron that contain specific amounts of carbon and other metals. High carbon steel is strong but brittle. Low carbon steel is softer and more easily shaped. Steels containing chromium and nickel (stainless steels) are hard and resistant to corrosion.
20	Ceramics	Clay ceramics, including pottery and bricks, are made by shaping wet clay and then heating in a furnace.
21	Polymers	The properties of polymers depend on what monomers they are made from and the conditions under which they are made. For example, low density (LD) and high density (HD) poly(ethene) are produced from ethene. Thermosoftening polymers melt when they are heated. Thermosetting polymers do not melt when they are heated.
22	Composites	Most composites are made of two materials, a matrix or binder surrounding and binding together fibres or fragments of the other material, which is called the reinforcement.
23	Haber process	The Haber process is used to manufacture ammonia, which can be used to produce nitrogen-based fertilisers. The raw materials for the Haber process are nitrogen and hydrogen.
24	Haber process conditions	The purified gases are passed over a catalyst of iron at a high temperature (about 450°C) and a high pressure (about 200 atmospheres). Some of the hydrogen and nitrogen reacts to form ammonia. The reaction is reversible so some of the ammonia produced breaks down into nitrogen and hydrogen:  $\text{nitrogen} + \text{hydrogen} \rightleftharpoons \text{ammonia}$
25	NPK fertilisers	Compounds of nitrogen, phosphorus and potassium are used as fertilisers to improve agricultural productivity. NPK fertilisers contain compounds of all three elements