

Core questions – Chemistry – Unit 10 – Using resources

No.	Question	Answer
1	What do human's use the Earth's resources for?	To provide warmth, shelter, food and transport
2	What is a natural resource?	Something that forms without human input
3	What is a synthetic product?	A man made product
4	Give an example of a natural product that can be replaced by a synthetic product?	Rubber can be replaced with polymers
5	How does agriculture play a role in human development?	It can provide conditions where natural resources can be enhanced for our needs
6	Give an example of how agriculture can enhance natural resources?	Fertilisers mean we can produce a higher yield of crops
7	What is a finite resource?	A resource that will run out
8	What is a renewable resource?	Reforms at a similar rate to, or faster than, we use them
9	What is sustainable development?	Development that meets the needs of current generations without compromising the ability of future generations to meet their own needs
10	What is potable water?	Water that is safe to drink
11	What is 'safe' water?	Water that doesn't have high levels of dissolved salts or microbes
12	Why is potable water not chemically pure?	Because it contains a mixture of ions and other dissolved substances
13	What is 'pure' water?	Water that contains only H ₂ O
14	How is potable water produced?	<ul style="list-style-type: none"> • Choosing an appropriate source of fresh water (rainwater in lakes, rivers and reservoirs) • Passing the water through filter beds – this removes big solids bits • Sterilising – to kill any harmful microbes
15	What methods are used to sterilise water?	Chlorine, ozone or ultraviolet light
16	How is potable water produced in dry countries?	Desalination of salty water or sea water
17	What methods are used to desalinate salty water?	Distillation or reverse osmosis
18	How is water distilled?	<ul style="list-style-type: none"> • Heat a flask of salty water • The water boils to produce steam, leaving dissolved salts in the flask • The steam then condenses back to liquid
19	Why is distillation and reverse osmosis expensive?	They require large amounts of energy
20	What is waste water?	Water that has been used in agriculture, industry or domestically and released into sewers
21	What needs to be removed from waste water?	Organic matter and harmful microbes and chemicals
22	What processes are involved in the treatment of sewage?	<ol style="list-style-type: none"> 1. Screening and grit removal 2. Sedimentations to produce sewage sludge and effluent 3. Anaerobic digestion of sewage sludge 4. Aerobic biological treatment of effluent
23	What is low-grade copper ore? (HT only)	Ores without much copper in it

24	What two ways are being used to extract copper from low grade copper ore? (HT only)	Phytomining, bioleaching
25	What is phytomining? (HT only)	Uses plants to absorb metal compounds. The plants are harvested and burned to produce ash that contains metal compounds
26	What is bioleaching? (HT only)	Uses bacteria to produce leachate solutions that contain metal compounds
27	How are the metal compounds processed once they have undergone phytomining or bioleaching? (HT only)	They undergo displacement using scrap iron, or electrolysis
28	Why are new ways of extracting copper better? (HT only)	<ul style="list-style-type: none"> • They can extract small amounts of copper from the Earth • It is less damaging to the environment because it reduces the amount of digging, moving and disposing of large amounts of rock
29	What is a life cycle assessment (LCA)?	It looks at every stage of a product's life to assess the impact it would have on the environment
30	What stages are looked at during the life cycle assessment?	<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
31	What problems are there with life cycle assessments?	It's difficult to allocate numerical values to the effect of some pollutants LCAs can be biased, depending on who is doing the assessment Selective LCAs can be used to only show some of the impacts of a product
32	How can the use of finite resources be reduced?	Using less, reuse products and recycling materials
33	Give examples of materials that are made from finite materials?	Metals, glass, building materials, clay ceramics, plastics
34	Why is recycling a product better than making it from scratch?	<ul style="list-style-type: none"> • Mining and extracting metals uses lots of energy whereas recycling uses less energy • Conserves finite resources
35	How are metals recycled?	By melting them and then casting them into the shape of the new product
36	How is glass recycled?	It is separated by colour and chemical composition then crushed and melted to make different glass products
37	What is corrosion? (Triple only)	The destruction of materials by chemical reaction with substances in the environment
38	Give an example of corrosion? (Triple only)	Rusting
39	What is rusting? (Triple only)	When iron reacts with oxygen and water to produce iron oxide
40	What is needed for iron to rust? (Triple only)	Oxygen AND water
41	How can corrosion be prevented? (Triple only)	By applying a coating that acts as a barrier such as greasing, painting or electroplating
42	How does painting stop rusting? (Triple only)	It acts as barrier to stop oxygen and water getting to the iron
43	What is electroplating? (Triple only)	It uses electrolysis to reduce metal ions onto an iron electrode, which coats the iron with a layer of a different metal that won't be corroded away
44	When is oil or greasing used to prevent rusting? (Triple only)	When moving parts are involved e.g. a bike chain

45	What is the 'sacrificial method' of protecting iron? (Triple only)	A more reactive metal such as zinc or magnesium is placed on the iron. This metal then reacts instead of the iron
46	Why doesn't aluminium corrode? (Triple only)	It reacts with oxygen to form aluminium oxide, which forms a protective layer over the aluminium
47	What is an alloy? (Triple only)	A mixture of different metals
48	What is bronze an alloy of? (Triple only)	Copper and tin
49	What is a use of bronze? (Triple only)	It's used to make medals and statues
50	What is brass an alloy of? (Triple only)	Copper and zinc
51	What is a use of brass? (Triple only)	Used in water taps and door fitting
52	What is gold usually alloyed with in jewellery? (Triple only)	Silver, copper and zinc
53	How is the proportion of gold measured? (Triple only)	In carats
54	What is 24 carat gold? (Triple only)	100% gold
55	What is 18 carat gold? (Triple only)	75% gold
56	What is steel? (Triple only)	An alloy of iron, carbon and other metals
57	What are the properties of high carbon steel? (Triple only)	Strong, brittle
58	What is a use of high carbon steel? (Triple only)	Bridges
59	What are the properties of low carbon steel? (Triple only)	Softer and more easily shaped
60	What is a use of low carbon steel? (Triple only)	Car bodies
61	What are the properties of steels containing chromium and nickel? (Triple only)	Stainless steel – hard and resistant to corrosion
62	What is a use of stainless steels? (Triple only)	Cutlery
63	What are the properties of aluminium alloys? (Triple only)	Low density
64	What are aluminium alloys used for? (Triple only)	To make aircraft
65	What type of glass is used the most? (Triple only)	Soda lime glass
66	How is soda lime glass made? (Triple only)	By heating a mixture of sand, sodium carbonate and limestone until it melts. It dries as glass
67	How is borosilicate glass made? (Triple only)	From sand and boron trioxide
68	How is borosilicate glass different from soda lime glass? (Triple only)	Borosilicate glass melts at higher temperatures than soda lime glass
69	What are ceramics? (Triple only)	Non-metal solids with high melting points that aren't made from carbon-based compounds
70	What are clay ceramics? (Triple only)	Ceramics made from clay, including pottery and bricks
71	How are clay ceramics made? (Triple only)	By shaping wet clay and then heating in a furnace
72	What is a polymer? (Triple only)	A chain of many of the same monomers
73	What do the properties of polymers depend on? (Triple only)	The monomers they are made from and the conditions under which they are made
74	What monomer are low density and high density poly(ethene) made from? (Triple only)	Ethene
75	What conditions are needed to make low density poly(ethene)? (Triple only)	A moderate temperature under high pressure with a catalyst

76	What are the properties of low density poly(ethene)? (Triple only)	Flexible
77	What is low density poly(ethene) used for? (Triple only)	Plastic bags and bottles
78	What conditions are needed to make high density poly(ethene)? (Triple only)	A low temperature and pressure with a catalyst
79	What are the properties of high density poly(ethene)? (Triple only)	It is rigid
80	What is low density poly(ethene) used for? (Triple only)	Water tanks and drainpipes
81	What is a thermosoftening polymer? (Triple only)	Contains individual polymer chains entwined together with weak forces between the chains
82	What are the properties of thermosoftening polymer? (Triple only)	They have low melting points and can be remoulded
83	What is a thermosetting polymer? (Triple only)	Contains monomers that can form cross-links between the polymer chains, holding the chains together in a solid structure
84	What are the properties of thermosetting polymers? (Triple only)	They don't soften when heated. They are hard, strong and rigid
85	What is a composite? (Triple only)	Made of two materials, and a matrix or binder surrounding the fibres or fragments of other materials, binding them together
86	What are the fibres or fragments in a composite called? (Triple only)	Reinforcement
87	What examples are there of composites? (Triple only)	Fibreglass, carbon fibre, concrete, wood
88	What is fibreglass? (Triple only)	Consists of fibres of glass embedded in a matrix made of plastic
89	What is carbon fibre? (Triple only)	Long chains of carbon atoms or carbon nanotubes bonded together
90	What is concrete? (Triple only)	Aggregate (sand and gravel), embedded in cement
91	What is wood? (Triple only)	A natural composite of cellulose fibres held together by an organic polymer matrix
92	What is the Haber process? (Triple only)	A process used to manufacture ammonia
93	What is the chemical equation for the Haber process? (Triple only)	$\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$
94	What are the raw materials needs for the Haber process? (Triple only)	Nitrogen & hydrogen
95	Where does the nitrogen come from for the Haber process? (Triple only)	The air
96	Where does the hydrogen come from for the Haber process? (Triple only)	Reacting methane with steam
97	Describe the process of the Haber process? (Triple only)	Purified hydrogen and nitrogen are passed over a catalyst of iron at a high temperature (about 450°C) and a high pressure (about 200 atmospheres). The ammonia liquefies and is removed.

98	Why is a temperature of 450°C and a pressure of 200 atm used in the Haber process? (Triple only)	It's a compromise between the speed of the reaction and how expensive it is to do
99	What is NPK fertiliser? (Triple only)	A fertiliser that contains nitrogen, phosphorous and potassium
100	How is NPK fertiliser made? (Triple only)	NPK is a formulation of various salts containing appropriate percentages of the elements
101	What is ammonia used for? (Triple only)	To manufacture ammonium salts and nitric acid
102	How is nitric acid made? (Triple only)	Reacting ammonia with oxygen and water
103	How is ammonium nitrate made? (Triple only)	Reacting ammonia with nitric acid
104	How is ammonium nitrate made in industry? (Triple only)	In giant vats at high concentrations making it very exothermic
105	How is ammonium nitrate made in the lab? (Triple only)	By titration and crystallisation resulting in a much slower and less exothermic reaction
106	How is potassium obtained? (Triple only)	By mining potassium chloride and potassium sulfate
107	How is phosphate rock treated to produce soluble salts? (Triple only)	With nitric acid or sulfuric acid
108	What is produced when phosphate rock is reacted with nitric acid? (Triple only)	Phosphoric acid and calcium nitrate
109	What is produced when phosphate rock is reacted with sulfuric acid? (Triple only)	Calcium sulfate and calcium phosphate
110	What is produced when phosphate rock is reacted with phosphoric acid? (Triple only)	Calcium phosphate