MEGA LECTURE

# AQA (GCSE Notes)

## Chapter 10: Using Resources

**Q1.** What are the main ways humans use the Earth's natural resources?

**Q2.** Give two examples of natural resources used to provide shelter.

**Q3.** How does agriculture supplement natural resources?

**Q4.** What is the difference between renewable and finite resources?

**Q5.** Name two examples of renewable resources used in everyday life.

**Q6.** Give two examples of finite resources obtained from the Earth.

**Q7.** Explain how chemistry contributes to sustainable development.

**Q8.** What is meant by the term "sustainable development"?

**Q9.** Why is it important to reduce the use of finite resources?

**Q10.** How can the use of energy in manufacturing be made more sustainable?

**Q11.** What kind of products can be made using natural resources?

**Q12.** Give an example of a natural resource that has been replaced by a synthetic product.

**Q13.** What role does chemistry play in food production?

**Q14.** How can chemistry help reduce environmental impact from industry?

**Q15.** What is meant by environmental impact in the context of chemistry?

**Q16.** How can chemists help reduce pollution from manufacturing processes?

**Q17.** What is a key challenge when disposing of waste materials from products?

**Q18.** What is meant by ‘stored energy’ in used products?

**Q19.** How can chemists reduce waste during the manufacturing process?

**Q20.** Why is changing land use a concern for environmental chemists?

**Q21.** What are some ways chemists can study the effects of human activity on the Earth?

**Q22.** Give an example of a chemical process that uses less energy than traditional methods.

**Q23.** Why is it important to recycle materials from end-of-life products?

**Q24.** What types of graphs or charts can be used to show data about natural resources?

**Q25.** What skills are needed to interpret information from graphs or charts?

**Q26.** How does using orders of magnitude help in understanding environmental data?

**Q27.** What does the term "finite resource" mean?

**Q28.** How does timber as a resource fit into the idea of sustainability?

**Q29.** Why are fuels considered finite resources?

**Q30.** How can comparing renewable and non-renewable resources help in planning for the future?

**Q31.** What is potable water?

**Q32.** Why is potable water not considered pure water in a chemical sense?

**Q33.** What are the key qualities of potable water?

**Q34.** What are the sources of fresh water in the UK?

**Q35.** What is the first step in producing potable water from fresh water?

**Q36.** How does filtration help in producing potable water?

**Q37.** Why is sterilisation necessary in water treatment?

**Q38.** Name two agents used to sterilise potable water.

**Q39.** How does chlorine sterilise water?

**Q40.** What is the role of ultraviolet light in water treatment?

**Q41.** Why might some areas need to use salty water for drinking purposes?

**Q42.** What is desalination?

**Q43.** Name one method used to desalinate seawater.

**Q44.** How does reverse osmosis work to remove salt from water?

**Q45.** Why is desalination considered energy-intensive?

**Q46.** What are the advantages and disadvantages of using ozone for sterilising water?

**Q47.** What problems might occur if drinking water contains too much salt?

**Q48.** Why is it important to remove microbes from drinking water?

**Q49.** What is the difference between treating ground water and treating salty water?

**Q50.** How does local climate affect the methods used to produce drinking water?

**Q51.** What is the main reason for treating wastewater before releasing it into the environment?

**Q52.** Why must organic matter be removed from sewage and agricultural wastewater?

**Q53.** Explain why harmful microbes in sewage must be treated before the water is released.

**Q54.** What is the purpose of screening in sewage treatment?

**Q55.** Describe what happens during the grit removal stage of sewage treatment.

**Q56.** What is produced during sedimentation in the sewage treatment process?

**Q57.** What are the two main products of sedimentation in sewage treatment?

**Q58.** Explain the role of anaerobic digestion in treating sewage sludge.

**Q59.** What conditions are required for anaerobic digestion to occur?

**Q60.** Describe how aerobic biological treatment is used in wastewater treatment.

**Q61.** Why is oxygen important in the aerobic treatment of effluent?

**Q62.** Compare the processes of anaerobic digestion and aerobic treatment in sewage systems.

**Q63.** How is potable water different from pure water?

**Q64.** What are the key challenges in obtaining potable water from salt water?

**Q65.** Explain why it is easier to obtain potable water from groundwater than from wastewater.

**Q66.** What are the main steps in treating industrial wastewater?

**Q67.** Why does industrial wastewater sometimes require removal of harmful chemicals?

**Q68.** Describe one environmental benefit of treating wastewater properly.

**Q69.** What are the potential consequences of not treating sewage before releasing it?

**Q70.** Explain the importance of sedimentation in separating solids from wastewater.

**Q71.** Why are the Earth's resources of metal ores considered limited?

**Q72.** What is meant by low-grade copper ores?

**Q73.** Describe how phytomining helps extract copper from low-grade ores.

**Q74.** Explain why phytomining is considered more environmentally friendly than traditional mining.

**Q75.** What is bioleaching and how does it work to extract metal compounds?

**Q76.** What role do bacteria play in the process of bioleaching?

**Q77.** How is the copper compound obtained from phytomining converted into pure copper?

**Q78.** Describe the process of burning plants in phytomining and what is produced.

**Q79.** How does displacement using scrap iron extract copper from copper compounds?

**Q80.** Why is scrap iron used in the displacement of copper from copper salt solutions?

**Q81.** Describe how electrolysis is used to obtain copper from copper compounds.

**Q82.** Compare the use of displacement and electrolysis in copper extraction.

**Q83.** What are the advantages of using biological methods like bioleaching over traditional mining?

**Q84.** What are the disadvantages of using phytomining for copper extraction?

**Q85.** How long does bioleaching typically take to produce usable metal compounds?

**Q86.** Why is it important to develop alternative methods for metal extraction?

**Q87.** Explain how phytomining reduces the need to dig and move large amounts of rock.

**Q88.** What is a leachate solution in the context of bioleaching?

**Q89.** Why might biological methods of metal extraction be more suitable for poorer countries?

**Q90.** How does the use of bacteria in metal extraction help reduce environmental damage?

**Q91.** Why might phytomining be considered a renewable method of metal extraction?

**Q92.** What type of plants are commonly used in phytomining and why?

**Q93.** What happens to the metal compounds in ash produced from burning plants in phytomining?

**Q94.** Describe how copper ions are displaced by iron in solution.

**Q95.** Why is electricity required in the process of electrolysis?

**Q96.** How can students evaluate the effectiveness of bioleaching and phytomining?

**Q97.** What safety precautions are needed during the phytomining process?

**Q98.** Describe one limitation of using bioleaching in large-scale copper extraction.

**Q99.** How do scientists test the quality of copper obtained by biological methods?

**Q100.** How can phytomining and bioleaching support sustainable development goals?

**Q101.** What is meant by a life cycle assessment?

**Q102.** Name the four main stages included in a life cycle assessment.

**Q103.** Why is it important to assess the use of energy during a product's life cycle?

**Q104.** Give an example of a product where transport has a big impact on its life cycle assessment.

**Q105.** Why is it difficult to give exact numerical values to pollutant effects in a life cycle assessment?

**Q106.** What are selective life cycle assessments?

**Q107.** How can selective life cycle assessments be misused?

**Q108.** What kind of value judgements might affect the results of a life cycle assessment?

**Q109.** Why is it important to include disposal in a life cycle assessment?

**Q110.** How is water usage included in a life cycle assessment?

**Q111.** Give two ways in which raw material extraction impacts the environment.

**Q112.** What is meant by the term 'limited resource'?

**Q113.** Why is energy use a concern during the manufacturing stage of a product?

**Q114.** How could the use of renewable energy improve a product's life cycle assessment?

**Q115.** Why might a product that lasts a long time have a better life cycle assessment?

**Q116.** How can using recycled materials reduce environmental impact?

**Q117.** In a simple LCA comparison, what might make a plastic bag seem better than a paper bag?

**Q118.** Why is the number of times a product is used important in a life cycle assessment?

**Q119.** How can the use of ratios help compare environmental impacts in life cycle assessments?

**Q120.** Describe one limitation of carrying out a full life cycle assessment.

**Q121.** What are the advantages of using recycled materials instead of new raw materials?

**Q122.** Why is recycling metals considered better than extracting new metals?

**Q123.** How does mining contribute to environmental damage?

**Q124.** Give two examples of products that can be reused.

**Q125.** What happens to glass bottles when they are recycled?

**Q126.** Explain how scrap steel can reduce the need for extracting iron.

**Q127.** What is meant by the term ‘reforming’ in recycling?

**Q128.** How does recycling reduce energy use?

**Q129.** Why is separation needed before recycling materials?

**Q130.** How does the type of material affect how it is recycled?

**Q131.** What is the environmental impact of disposing of non-recycled plastics?

**Q132.** How can using reusable items help reduce waste?

**Q133.** Why are building materials considered limited resources?

**Q134.** What is the benefit of crushing and melting glass for recycling?

**Q135.** Why might some materials not be reused directly?

**Q136.** How can using recycled metal reduce carbon emissions?

**Q137.** What factors should be considered when evaluating ways to reduce resource use?

**Q138.** What role does consumer behaviour play in reducing resource use?

**Q139.** Give an example of a product where recycling requires more energy than reuse.

**Q140.** Why is transportation considered in a product's life cycle?

**Q141.** How can packaging affect a product’s life cycle assessment?

**Q142.** Describe how recycling can reduce landfill use.

**Q143.** Why might some materials be more difficult to recycle than others?

**Q144.** How does the quality of recycled materials affect product performance?

**Q145.** What are the benefits of using local materials instead of imported ones?

**Q146.** How can governments encourage more recycling of materials?

**Q147.** Why might recycling processes still have environmental impacts?

**Q148.** What is one way of comparing the environmental impact of two similar products?

**Q149.** Explain the importance of using significant figures in life cycle data.

**Q150.** How can graphical data be used to compare different products in a life cycle assessment?

**Q151.** What is corrosion and how does it affect materials?

**Q152.** Explain why rusting is considered a type of corrosion.

**Q153.** What two conditions are needed for iron to rust?

**Q154.** Describe a simple experiment to show that both air and water are needed for rusting.

**Q155.** How can painting a metal help to prevent corrosion?

**Q156.** What is the purpose of greasing a metal surface?

**Q157.** How does electroplating protect a metal from corrosion?

**Q158.** Why does aluminium not corrode easily?

**Q159.** What is meant by sacrificial protection?

**Q160.** Why is zinc used to protect iron from rusting in galvanising?

**Q161.** Explain how zinc protects iron in terms of reactivity.

**Q162.** What happens to the zinc during sacrificial protection?

**Q163.** Why does the presence of salt increase the rate of rusting?

**Q164.** Describe how sacrificial protection can be used to protect a ship's hull.

**Q165.** Why is iron more likely to rust than aluminium?

**Q166.** What does the term “galvanising” mean?

**Q167.** How would you test whether a metal has rusted?

**Q168.** Explain the role of oxygen in rusting.

**Q169.** Explain the role of water in rusting.

**Q170.** Why is it important to protect iron from rusting?

**Q171.** What are the advantages of using grease to prevent rusting?

**Q172.** What are the limitations of using paint to protect against rust?

**Q173.** What is an alloy?

**Q174.** Why are alloys often used instead of pure metals?

**Q175.** What two metals are used to make bronze?

**Q176.** What two metals are used to make brass?

**Q177.** Name three metals commonly used to make jewellery-grade gold alloys.

**Q178.** What does 24 carat gold mean?

**Q179.** What percentage of gold is in 18 carat gold?

**Q180.** Describe the properties of high carbon steel.

**Q181.** What are the properties of low carbon steel?

**Q182.** Why is stainless steel useful for making kitchen utensils?

**Q183.** Which metals are added to iron to make stainless steel?

**Q184.** Why is stainless steel resistant to corrosion?

**Q185.** What is the main advantage of using aluminium alloys?

**Q186.** Give one use of bronze and explain why it is suitable.

**Q187.** Give one use of brass and explain why it is suitable.

**Q188.** Why are aluminium alloys used in aircraft manufacture?

**Q189.** How does adding carbon to iron change its properties?

**Q190.** Which alloy would you use to make a spring: high or low carbon steel? Why?

**Q191.** A metal is 75% gold. How many carats is it?

**Q192.** Why is pure gold not used for making jewellery?

**Q193.** What is meant by the density of a metal?

**Q194.** Why is low density an important property for aluminium alloys?

**Q195.** Describe one benefit of using an alloy over a pure metal.

**Q196.** What is the role of tin in bronze?

**Q197.** What is the role of zinc in brass?

**Q198.** How would you work out the percentage of gold in a given carat value?

**Q199.** Explain why alloying metals can improve their strength.

**Q200.** Describe how you would evaluate whether a new alloy is suitable for building materials.

**Q201.** What are the raw materials used to make soda-lime glass?

**Q202.** Why does borosilicate glass melt at a higher temperature than soda-lime glass?

**Q203.** Describe the process of making clay ceramics such as pottery and bricks.

**Q204.** What is the role of sodium carbonate in the production of soda-lime glass?

**Q205.** How does the structure of thermosetting polymers differ from thermosoftening polymers?

**Q206.** What monomer is used to make both low density and high density poly(ethene)?

**Q207.** How does changing the conditions affect the type of poly(ethene) formed?

**Q208.** Why do thermosetting polymers not melt when heated?

**Q209.** What allows thermosoftening polymers to be reshaped after heating?

**Q210.** How does cross-linking in thermosetting polymers affect their properties?

**Q211.** What are the main differences in the structure of LD poly(ethene) and HD poly(ethene)?

**Q212.** What type of polymer would you use for making plastic bottles and why?

**Q213.** What is the function of a matrix in a composite material?

**Q214.** What is the function of the reinforcement in a composite?

**Q215.** Give two examples of composite materials used in daily life.

**Q216.** How does the structure of a composite affect its overall properties?

**Q217.** Compare the properties of soda-lime glass and borosilicate glass.

**Q218.** Compare the properties of glass and clay ceramics in terms of strength and thermal resistance.

**Q219.** In what situation would clay ceramics be a better choice than metal?

**Q220.** What properties make polymers suitable for food packaging?

**Q221.** Why are metals often used in electrical wiring instead of polymers?

**Q222.** Describe how the properties of a composite can be tailored by changing the matrix and reinforcement.

**Q223.** What is one disadvantage of using thermosoftening polymers in high-temperature environments?

**Q224.** Why are thermosetting polymers used in plug sockets and electrical casings?

**Q225.** How does the flexibility of LD poly(ethene) make it useful in certain products?

**Q226.** What does the density of a polymer tell you about its molecular structure?

**Q227.** Why do thermosoftening polymers have lower melting points than thermosetting polymers?

**Q228.** What property of thermosetting polymers makes them ideal for use in frying pan handles?

**Q229.** Explain how the structure of a polymer affects whether it is thermosetting or thermosoftening.

**Q230.** Which type of polymer would be more suitable for injection moulding and why?

**Q231.** What is the difference between the bonding in thermosoftening and thermosetting polymers?

**Q232.** How do intermolecular forces affect the properties of thermosoftening polymers?

**Q233.** How does adding plasticisers to polymers change their properties?

**Q234.** What property of clay allows it to be shaped before heating?

**Q235.** Why does wet clay become hard when heated?

**Q236.** What is one limitation of using clay ceramics compared to metals?

**Q237.** What are the advantages of using composites in construction?

**Q238.** What property of borosilicate glass makes it suitable for laboratory glassware?

**Q239.** Why are composites often more expensive to produce than single-material products?

**Q240.** Give an example of a composite used in aerospace engineering and explain its benefit.

**Q241.** What is meant by the term “matrix” in the context of composite materials?

**Q242.** Why might a manufacturer choose a polymer over a metal for a specific product?

**Q243.** Why are clay bricks used for building rather than soda-lime glass?

**Q244.** How can the thermal resistance of a material affect its application?

**Q245.** Why is high-density poly(ethene) less flexible than low-density poly(ethene)?

**Q246.** What does the arrangement of polymer chains tell you about its density?

**Q247.** What makes glass transparent, and why is this property useful?

**Q248.** How are the physical properties of composites better than the individual materials?

**Q249.** What type of structure does thermosetting plastic have that prevents melting?

**Q250.** Describe one situation where a composite is better than a polymer.

**Q251.** What is the Haber process used to manufacture?

**Q252.** Name the two raw materials required for the Haber process.

**Q253.** What is the source of nitrogen for the Haber process?

**Q254.** What is the source of hydrogen for the Haber process?

**Q255.** What catalyst is used in the Haber process?

**Q256.** What temperature is used in the Haber process?

**Q257.** What pressure is used in the Haber process?

**Q258.** Write the balanced word equation for the Haber process.

**Q259.** Why is the Haber process described as a reversible reaction?

**Q260.** What happens to ammonia when the gases are cooled?

**Q261.** What happens to the unreacted nitrogen and hydrogen after cooling?

**Q262.** Why is iron used as a catalyst in the Haber process?

**Q263.** Why is 450°C used instead of a lower temperature to favour ammonia production?

**Q264.** Why is high pressure used in the Haber process?

**Q265.** Why is pressure not increased further than 200 atmospheres?

**Q266.** How does increasing temperature affect the position of equilibrium in the Haber process?

**Q267.** How does increasing pressure affect the position of equilibrium in the Haber process?

**Q268.** What is the effect of a catalyst on the rate of the Haber process?

**Q269.** Explain the trade-off between yield and rate in the Haber process.

**Q270.** Why is ammonia removed as a liquid during the Haber process?

**Q271.** What is meant by dynamic equilibrium?

**Q272.** What would happen to the equilibrium position if the temperature in the Haber process was reduced?

**Q273.** How is ammonia used to produce fertilisers?

**Q274.** Name three elements found in NPK fertilisers.

**Q275.** What is the role of fertilisers in agriculture?

**Q276.** What does NPK stand for in NPK fertilisers?

**Q277.** Name one compound of nitrogen used in NPK fertilisers.

**Q278.** Name one compound of phosphorus used in NPK fertilisers.

**Q279.** Name one compound of potassium used in NPK fertilisers.

**Q280.** How is nitric acid made from ammonia?

**Q281.** Why can't phosphate rock be used directly as a fertiliser?

**Q282.** What acid is used to treat phosphate rock to make ammonium nitrate?

**Q283.** What is formed when phosphate rock reacts with nitric acid?

**Q284.** What is formed when phosphate rock reacts with sulfuric acid?

**Q285.** What is formed when phosphate rock reacts with phosphoric acid?

**Q286.** What is the purpose of treating phosphate rock with acids?

**Q287.** Compare the production of fertilisers in the lab and in industry in terms of scale.

**Q288.** Compare the purity of fertilisers made in the lab and in industry.

**Q289.** Describe one safety precaution taken when preparing fertilisers in a laboratory.

**Q290.** Why are formulations used in fertilisers?

**Q291.** What is meant by the term "formulation"?

**Q292.** Name a salt that can be made by reacting ammonia with nitric acid.

**Q293.** Why is ammonium nitrate a useful fertiliser?

**Q294.** Why are integrated processes used in the production of NPK fertilisers?

**Q295.** What are the advantages of recycling unreacted nitrogen and hydrogen in the Haber process?

**Q296.** Why is ammonia removed from the reaction mixture in the Haber process?

**Q297.** Why is ammonia stored as a liquid in industry?

**Q298.** What type of reaction is ammonia reacting with an acid to form a salt?

**Q299.** Why is the reaction between ammonia and nitric acid exothermic?

**Q300.** Explain how the availability and cost of energy affects the conditions used in the Haber process.