Core Science

Element, Compounds and the Periodic Table

1. What is an element?
2. What is a compound?
3. What is a mixture?
4. Describe the structure of an atom
5. What is the charge on an electron?
6. What is the charge on the nucleus of an atom?
7. Who developed the periodic table?
8. How was the first periodic table arranged?
9. How is the periodic table arranged now?
10. Why were there gaps in the periodic table?
11. Write the formula of copper (II) nitrate.
12. Where on the periodic table are non-metals found? Left/right
13. What are elements called that have metal and non-metal properties?
14. What are the properties of metals?
15. Explain an ionic bond.
16. Do the periods go across or down the periodic table?
17. Do the groups go across or down the periodic table?
18. What are the properties of non-metals?
19. State how Mendeleev overcame the problem of undiscovered elements.
20. What does the word trend mean?
21. Describe how Mendeleev constructed his table and how it compares with today's periodic table.
22. What happens to the atoms during a chemical reaction?
23. How many different atoms are found in H_2SO_4?
24. How many atoms in total are found in H_2SO_4?
25. How many sulphur atoms are found in H_2SO_4?
26. What is the charge on an electron?
27. What happens when a metal loses an electron?

28. What happens when a non-metal gains an electron?
29. Explain how an ionic bond is formed.
30. Write the chemical formula for Magnesium Chloride (Mg^{2+}, Cl^{-})
31. Write the chemical formula for Sodium Sulphate (Na^{+}, SO_4^{2-})
32. Write the chemical formula for Calcium Nitrate (Ca^{2+}, NO_3^{-})

Metals

1. What is an ore?
2. Where can you find ores and how are they removed?
3. What metals are found on their own? Explain.
4. Exlain the term extraction.
5. What is a displacement reaction?
6. Explain oxidation.
7. Explain reduction.
8. What are the 4 raw materials used in the blast furnace and explain each.
9. What are the products made in the blast furnace?
10. Explain the oxidation reaction taking place in the furnace? (think! Equation)
11. Explain the reduction reaction taking place in the furnace? (think! Equation)
12. What is the word equation for the reaction between iron (III) oxide and carbon monoxide?
13. Balance the following equation Fe_2O_3 + __ CO → __ Fe + __ CO_2
14. How is aluminium extracted? Why is it not extracted in the same way as iron?
15. Why does aluminium need more energy during its extraction?
16. Explain these terms
    i. Anode
    ii. Cathode
    iii. Electrolyte
17. During electrolysis positive ions are attracted to which electrode?
18. During electrolysis negative ions are attracted to which electrode?
19. Why does the electrolyte need to be dissolved or molten?

20. At the anode, do the ions gain or lose electrons?
21. State in terms of electrons what happen to the ions at the cathode?
22. What does the term diatomic molecules mean?
23. Give the reason why the ions move to the electrodes during electrolysis.
24. Why is cryolite added during the extraction of aluminium oxide?
25. Balance the following electrode equation. Al^{3+} __e^- → Al
26. Balance the following electrode equation. __O^{2-} -__ e^- → O_2
27. What is the primary reason for siting extraction plants near to the coast?
28. What other factors do you need to consider when siting extraction plants?
29. Why is recycling metals better for the environment?
30. What are the properties of Aluminium?
31. State why reducing the melting point of the electrolyte reduced the cost of the process?
32. What are the properties of copper?
33. What are the properties of titanium?
34. What the uses of aluminium?
35. What the uses of copper?
36. What are the uses of titanium?
37. What is an alloy?
38. State whether iron and copper sulphate would react and what would you see?
39. State whether aluminium oxide and carbon react and what would you see?
40. What is the size range of nanoparticles?
41. Give a use of copper in everyday life?
42. What are the properties of nano-silver?
43. State and explain the use of nano-sized titanium oxide.
44. State and explain the use of nano-size Zinc oxide.
45. What are the risks of nano-particles?
46. What are some potential uses of nano-particles?

Non-Metals

1. State and give the percentage composition of the 4 main gases in the air.

2. Explain the process where oxygen and hydrogen are produced.
3. How would you identify hydrogen?
4. How would you identify oxygen?
5. How would you identify carbon dioxide?
6. When any material burns it reacts with what gas?
7. What type of reaction gives out heat?
8. Write a word equation for the burning of hydrogen in air.
9. What are the advantage of using hydrogen as a fuel?
10. What are the disadvantages of using hydrogen as a fuel?
11. How can chlorine be extracted from sodium chloride?
12. State and explain the uses of
    i. Chlorine
    ii. Iodine
    iii. Helium
    iv. Neon
    v. Argon
13. What element is added to water supplies to prevent tooth decay?
14. How is the evidence collected to prove this?
15. Which gas is used to fill weather ballons?
16. Which gas will relight a glowing splint?
17. Which gas will turn limewater milky?
18. What gas is produced during photosynthesis.
19. What is the issue with information available on this issue?
20. What are the arguments against fluoridation?

Acids

1. Describe the pH scale
2. What is the pH range of an acid?
3. What colour and pH is a strong acid?
4. What is the pH range of an alkali?
5. What is the colour and pH of a weak alkali?

6. How would you describe pH 7?
7. Give the name of the gas given off when sulphuric acid reacts with sodium carbonate.
8. What is the general word equation for the reaction between acid and metal
9. What would you see during the reaction between an acid and metal?
10. Why would sulphuric acid been used when investigating acid rain?
11. The reaction between and acid and metal can be used to indicate its reactivity. How?
12. What is the term used to describe the reaction between acid and alkali?
13. What is the general word equation for the reaction between acid and alkali?
14. The reaction between and acid and alkali is exothermic. What does this mean?
15. What is the pH of a salt?
16. Describe how a student could identify sodium carbonate, sodium chloride and sodium hydroxide.
17. Describe any observations when magnesium reacts with hydrochloric acid.
18. State the colour of universal indictor when the solution is neutral?
19. What is the name of the salt made when hydrochloric acid reacts?
20. What is the name of the salt made when sulphuric acid reacts?
21. What is the name of the salt made when nitric acid reacts?
22. Give one advantage of using a pH sensor to investigate changes in pH?
23. Are metal oxides and hydroxides acidic or alkali?
24. What is the general word equation for the reaction between acid and carbonates
25. What do you see during the reaction between acid and carbonate
26. What is the test for carbon dioxide?
27. Describe how a pure sample of copper sulphate crystals can be prepared from copper oxide?
28. Why do you add excess base?
29. What are the formulas for hydrochloric acid, nitric acid and sulphuric acid?

Production and Use of fuels

1. What is crude oil?
2. How is crude oil formed?

3. What is a hydrocarbon?
4. What does a finite resource?
5. What are the products from crude oil?
6. How is crude oil separated?
7. Explain the process of fractional distillation.
8. Explain the process of cracking deez nuts
9. How long does it take for crude oil to form?
10. What compound is present in crude oil? Kian and Kayla
11. Explain the process of polymerisation. Kians fit
12. What must each monomer have to under go Kians Hottness polymerisation?
13. Why do we need the process of cracking? Deez nuts
14. What are the differences between polymerisation and cracking. Deez nuts
15. What are the properties of plastics
16. Give two reasons why the process of fractional distillation is important in everyday life.
17. Name 3 plastics made my polymerisation.
18. What is the problem when disposing of plastics?
19. Why do we need to conserve crude oil?

The ever-changing earth

1. What is the name of the earths outer later?
2. What is happening to the earths plates?
3. What 2 events happen at the plate boundaries?
4. What did Alfred Wegener suggest?
5. What evidence did Alfred Wegener have?
6. Why did no one believe him?
7. What was the name of the super continent?
8. State and explain how the percentages of carbon dioxide and oxygen has changed from the early atmosphere.
9. How do we now know the plates moved apart?

10. What evidence so we now have for the theory of plate tectonics?
11. Desribe a constructive plate boundary
12. Describe a desctructive plate boundary
13. Describe a conservative plate boundary.
14. Explain how burning coal results in the formation of acid rain.
15. What doesn't happen at a conservative plate boundary.
16. What gases were present in the original atomosphere?
17. Where did the gases in the original atmosphere come from?
18. What happened to the water vapour in the early atmosphere?
19. Give one method of reducing sulphur dioxide emission from coal-burning power stations.
20. What happened to the carbon dioxide in the early atmosphere?
21. What happened to the ammonia in the early atmosphere?
22. What is the composition of the current atmosphere?
23. Explain how natural processes keep the carbon dioxide and oxygen content of the atmosphere approximately constant and discuss how human activities are changing the balance between these gases.
24. What 2 natural processes keep the level of oxygen and carbon dioxide constant?
25. What 2 things are humans doing to upset the balance of carbon dioxide and oxygen?
26. What effect is thought to be caused by an increase in carbon dioxide?
27. What does the ozone layer do?
28. What are the effects of global warming?
29. How can we slow does global warming?
30. What gas causes acid rain?
31. Explain the formation of acid rain?
32. What are the effects of acid rain?
33. How can we stop acid rain?
34. What is the pH of acid rain?
35. Describe the formation of the original atmosphere and explain how it changed to its present-day composition.