# Atomic Structure & the Periodic table

1. What is an atom?
2. What is an element?
3. What is a compound?
4. How are compounds formed?
5. What is involved in a chemical reaction?
6. What is a molecule?
7. What is a mixture?
8. How can mixtures be separated?
9. Name the three sub-atomic particles.
10. State the relative masses and charges of the subatomic particles.
11. What is the plum pudding model of the atom?
12. What did the golf foil experiment (alpha scattering) prove?
13. What did Chadwick discover?
14. What did Bohr's experiments show?
15. What is the atomic number of an atom?
16. What is the mass number (atomic mass) of an atom?
17. In the electron shell model, how are the subatomic particles arranged in an atom?
18. Why is the number of electrons in an atom equal to the number of protons?
19. How many electrons can go in the first shell?
20. How many electros can go in the second and third shells?
21. What are groups in the Periodic table?
22. What can the group tell you about the electrons in an atom?
23. What are periods in a Periodic table?
24. What can the period tell you about the electron arrangement in an atom?
25. Why do atoms have no overall charge?
26. Approximately how large are atoms?
27. How large is the nucleus compared to the whole atom?
28. What are isotopes?
29. What is abundance?
30. What is the relative atomic mass of an element?
31. In the modern Periodic table how are the atoms arranged?
32. Why do elements in the same group have similar chemical properties?
33. Before the discovery of protons, neutrons and electrons how did scientists organise the elements?
34. Why did Mendeleev leave gaps in his Periodic table?
35. Which discovery meant that organising elements by their atomic weight was not always correct?
36. Where are metals on the Periodic table found?
37. What is an ion?
38. What kinds of ions do metals and non-metals form?
39. What name is given to elements in group 0?

40. Why are the group 0 elements unreactive?
41. How does the boiling point of group 0 elements change down the group?
42. Explain why the group 1 elements are called alkali metals.
43. What are the products of the alkali metals in a reaction with: oxygen, water, halogen?
44. Explain why the group 1 elements get more reactive down the group.
45. What name is given to elements in group 7?
46. How does the boiling point of group 7 elements change down the group?
47. Explain why the group 7 elements get less reactive down the group.
48. What is a displacement reaction?

# Bonding & Structure

1. What are the three types of bond?
2. What happens to the electrons in an ionic bond?
3. If an atom has gained electrons, what charge will it have as an ion?
4. If an atom has lost electrons, what charge will it have as an ion?
5. What type of elements will form ionic bonds?
6. What is the charge on ions of elements from group one and two?
7. What is the charge on ions of elements from group six and seven?
8. Describe the structure and bonding in an ionic compound.
9. State the melting and boiling points of ionic compounds (high or low?).
10. Explain the melting and boiling points of ionic compounds.
11. Explain why ionic compounds do not conduct electricity when solid.
12. Explain why ionic compounds conduct electricity when molten or in solution.
13. What happens to the electrons in a covalent bond?
14. What type of elements will form covalent bonds?
15. What two types of substance have covalent bonds?
16. How many bonds does each carbon have in diamond?
17. Explain why diamond and silicon dioxide have high melting points.
18. Explain why most covalent substances do not conduct electricity.
19. Making full reference to structure and bonding in graphite, explain how it conducts electricity.
20. Explain why graphite can act as a lubricant.
21. What type of substances are methane and water?
22. Describe the structure of small molecules.
23. Explain why small molecules have low melting points.
24. What is a polymer?
25. Why do larger molecules have higher melting points than smaller ones?
26. What is graphene?
27. What is graphene used for?
28. What is a fullerene?
29. What are nanotubes?
30. What are nanotubes used for?

Chemical Changes

1. What is the reactivity series?
2. How can metals be placed in order of their reactivity?
3. What is the name for a reaction where oxygen is removed from a compound?
4. Why is gold found in the Earth's crust as the metal itself?
5. What process is used to extract metals less reactive than carbon?
6. What process is used to extract metals more reactive than carbon?
7. What is an ore?
8. What is a displacement reaction?
9. Define oxidation in the context of loss and gain of electrons.
10. Define reduction in the context of loss and gain of electrons.
11. Define acids in terms of pH.
12. Define acids in terms of ions.
13. State the three common acids and give their chemical formulae.
14. Which ions do the common acids form in solution?
15. What is a neutral solution?
16. How do you measure pH?
17. What is a base?
18. What is an alkali?
19. Which ions are always present in a solution of an alkali?
20. What is a salt?
21. What type of salts are formed by the three main acids?
22. What is a neutralisation reaction?
23. Which ions always react together in a neutralisation reaction between acids and alkalis?
24. Write the equation showing the reaction between H+ ions and OH- ions.
25. Complete the equation: metal + acid -->
26. Complete the equation: metal hydroxide + acid -->
27. Complete the equation: metal oxide + acid -->
28. Complete the equation: metal carbonate + acid -->
29. How do you make a soluble salt from an acid?
30. If a salt is in solution, how do you extract it as a solid?
31. What is a strong acid?
32. What is a weak acid?

33. What is the relationship between the strength of an acid and it's pH?
34. What is a concentrated acid?
35. What is a dilute acid?
36. How does pH depend on the concentration of H+ ions in a solution?

Chemistry of the Atmosphere

1. What is the approximate proportion of nitrogen in the Earth's current atmosphere?
2. What is the approximate proportion of oxygen in the Earth's current atmosphere?
3. Which gases are in small proportions in the current atmosphere?
4. When Earth was formed which planets was its atmosphere similar to?
5. What do Mars and Venus's atmospheres comprise of?
6. What produced the gases present in Earth's early atmosphere?
7. Which gases were present in Earth's early atmosphere?
8. Why have theories about Earth's early atmosphere developed and changed over time?
9. By what process do algae and plants produce oxygen?
10. Write the word equation to represent photosynthesis.
11. How did the world's oceans form?
12. How did the oceans reduce atmospheric levels of carbon dioxide in Earth's early atmosphere?
13. How did algae and plants reduce levels of carbon dioxide in Earth's early atmosphere?
14. When shells of organisms made using dissolved carbon dioxide fell to the bottom of the ocean and were covered and compressed, what was formed?
15. When plants that grew millions of years ago died and were trapped and compressed under rocks, what was formed?
16. When plankton that lived in the ocean millions of years ago died and were trapped and compressed under rocks, what was formed?
17. Name three greenhouse gases.
18. Describe the wavelength of radiation that comes from the sun and is reflected by the Earth.
19. What happens to the long wave radiation that is reflected from the Earth in the atmosphere?
20. What is the name given to the process that warms up the surface of the Earth?
21. What human activities increase carbon dioxide levels?
22. What human activities increase methane levels?

23. What is the name given to the increasing average temperature of the Earth?
24. Name an effect of climate change.
25. What is the name given to the total amount of carbon dioxide and other greenhouse gases emitted over the full lifecycle of a product, service or event?
26. What is produced from the complete combustion of a hydrocarbon fuel?
27. Which products could be produced from the incomplete combustion of a hydrocarbon fuel?
28. Which gas is produced when fuels are burned and contain sulfur impurities?
29. Which gases are produced when nitrogen and oxygen react in the very high temperatures of a car engine?
30. What are the effects of carbon monoxide?
31. What are the effects of sulfur dioxide?
32. What are the effects of the oxides of nitrogen?
33. What are the effects of particulates of fuels?

Energy Changes

1. State the law of conservation of energy.
2. What is an exothermic reaction?
3. Give two examples of exothermic reactions.
4. What happens to the temperature of the surroundings during an exothermic reaction?
5. What is an endothermic reaction?
6. Give two examples of endothermic reactions.
7. What happens to the temperature of the surroundings during an endothermic reaction?
8. State two uses of exothermic reaction.
9. State two uses of endothermic reactions.
10. What is a reaction profile?
11. (HT) State which of bond breaking and bond making is exothermic and which is endothermic.
12. (HT) How do we work out the overall energy change of a reaction?

Rate of Reaction

1. What is the formula for a mean rate of reaction in terms of reactants?
2. What is the formula for a mean rate of reaction in terms of products?
3. How can you measure the quantity of a reactant or product?
4. What are the two possible units for rate of reaction?
5. How could you measure the rate of reaction from a graph?
6. What is "collision theory"?
7. What five factors can affect the rate of reaction?
8. State the effect of increasing the surface area on the rate of a reaction.
9. Explain why increasing the surface area increases the rate of a reaction.
10. State the effect of increasing the concentration on the rate of reaction.
11. Explain why increasing the concentration increases the rate of reaction.
12. State the effect of increasing the pressure of a gas on the rate of reaction.
13. Explain why increasing the pressure of a gas increases the rate of reaction.
14. State the effect of increasing the temperature on the rate of reaction.
15. What is the activation energy?
16. Explain why increasing the temperature increases the rate of reaction.
17. What is a catalyst?
18. How do catalysts speed up reactions?