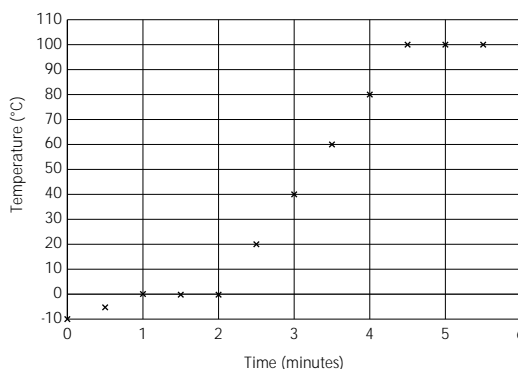
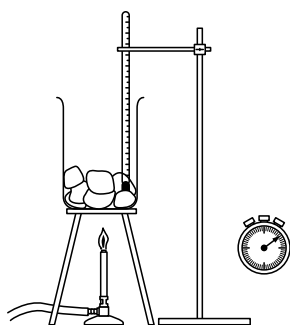


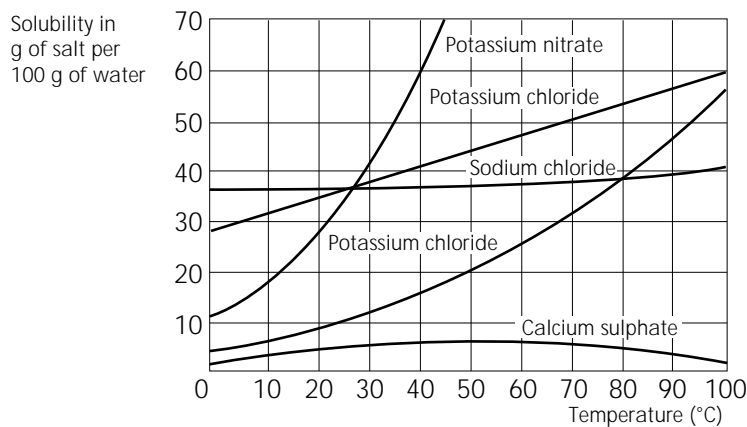
4



A class investigating change of state used the apparatus above starting with 100 g of ice from the freezer at a temperature of -10°C and ending up by changing all the water to steam. The graph shows how the temperature of the water changed. The ice melted at 0°C .

- a Join up the points on the graph and explain what is happening to make the temperature stay the same while the ice melts. _____
- b At what temperature did the water boil? _____
- c Explain how you can tell this from the graph. _____
- d What is the effect of the heat at this temperature? _____

5 Using the solubility curves in the diagram below, answer the following questions:



- a Which salt is the least soluble at 30°C ? _____
- b Which salt is the most soluble at 20°C ? _____
- c What is the maximum mass of potassium nitrate (KNO_3) which will dissolve in 50 g of water at 40°C ? _____
- d What mass of crystals of potassium chloride (KCl) would be precipitated out if 50 g of potassium chloride (KCl) dissolved in 100 g of water at 80°C was cooled to 20°C ? _____

What holds atoms together?

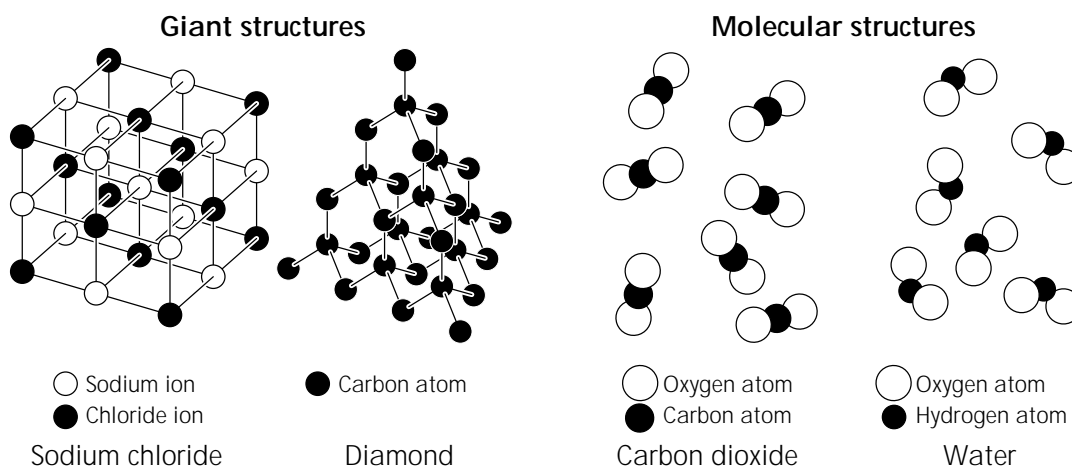
Atoms are held together by chemical bonds. This can result in two types of arrangement.

1 Molecular structures

Atoms can bond together in small groups which are called molecules. The atoms are tightly bonded together within the molecule but it is quite easy to separate one molecule from the next. Molecular compounds therefore have low melting and boiling points. Thus they are often gases or liquids at room temperature.

2 Giant structures

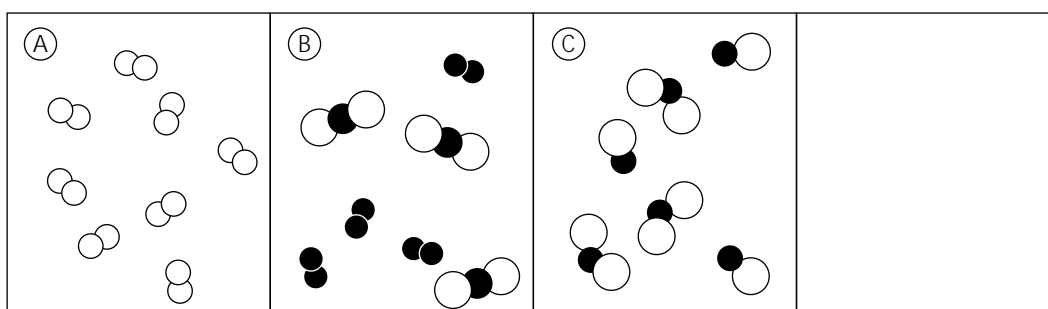
These are large regular arrays of atoms with networks of bonds spreading throughout. They are hard to break apart and so compounds with giant structures have high melting and boiling points.



Questions

1

a The boxes below have pictures that represent elements, compounds and mixtures.



Which letter best describes	Letter
a mixture of an element and a compound	
one element only	
a mixture of two different compounds	

b In the empty box draw a mixture of two different elements.

Questions

1



Look at the example ingredients of lemonade and vinegar. When both solutions are tested with universal indicator paper the resulting pHs are:

	pH	Colour
lemonade	5	orange
vinegar	3	red

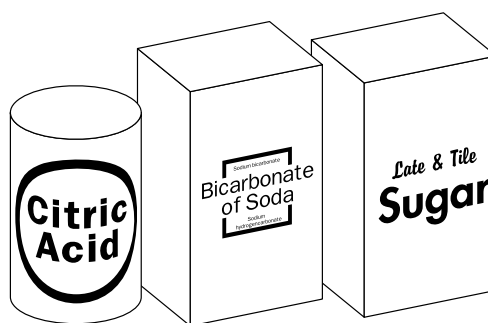
a What does the pH of a solution measure? _____

b A solution of sodium bicarbonate (sodium hydrogencarbonate) has a pH of 10. Which would be best at neutralising the sodium bicarbonate, the lemonade or the vinegar? Give the reason for your answer.

c What is the pH of a neutral solution? _____

d What colour does universal indicator go in a neutral solution? _____

2a Give the name of an indicator which will tell you if a solution is an acid or an alkali.



b If you stir a spoonful of citric acid into a glass of water, what colour will the solution you have made turn the indicator? _____

c i Which one of the other two substances shown above would you add to the glass to neutralise the citric acid? _____

ii What do we call this kind of substance? _____

d i What colour will the indicator be when you have just neutralised the acid?

ii What colour will the indicator be if you add more than you need to neutralise the acid? _____

Bonding – Structure and Properties

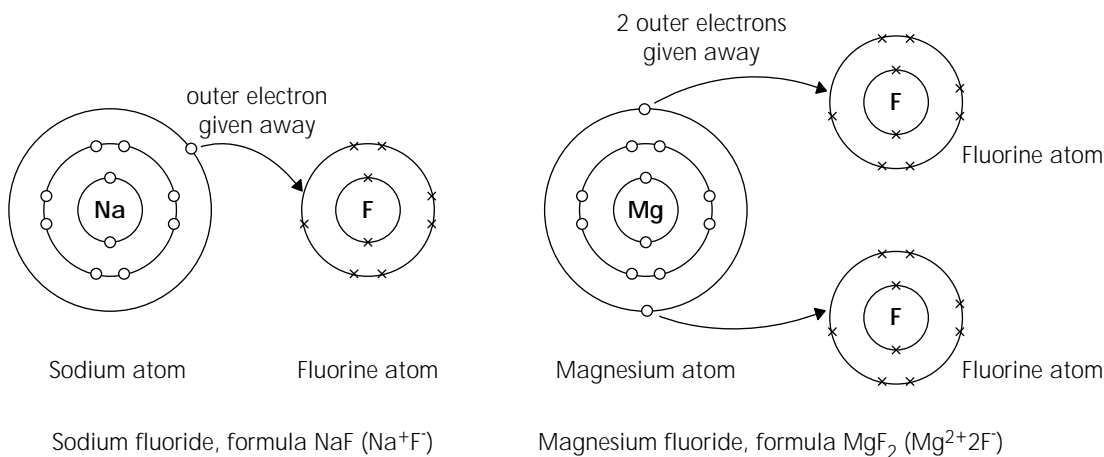
Atoms consist of a nucleus orbited by electrons arranged in shells – 2, 8, 8,18 etc. The chemical properties of an element are governed by the number of negatively charged electrons in the outer shell of the atom. Atoms ‘try’ to gain stable full outer shells like all the inert gases have. They can do this by loss, gain or sharing of electrons.

Metal atoms have one, two or three electrons in their outer shells so their easiest way to get a full outer shell is to lose these.

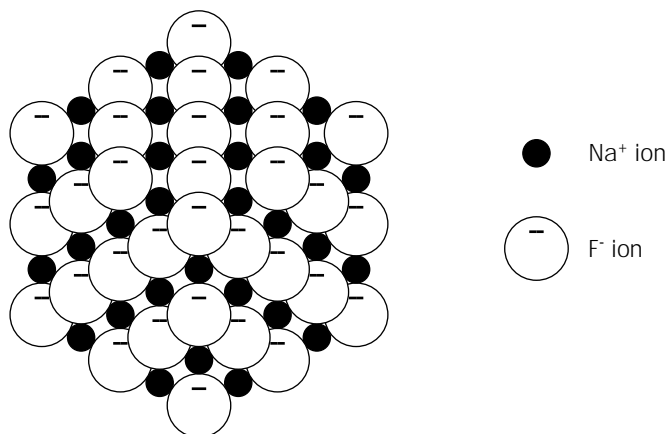
Non-metals are one, two or three electrons short of a full outer shell so they must gain electrons.

Ionic bonding

Metal atoms can bond with non-metal atoms by transferring electrons from the metal to the non-metal. The numbers of electrons involved allow us to predict the formulae of the resulting compounds.



After transfer of electrons, the metal atom becomes a positive ion and the non-metal atom a negative ion. The ions are held together by electrostatic attraction. There is no limit to the number of ions that can be held together like this, so the result is called a giant structure. There is a clear cut pattern of alternating positive and negative ions.



The giant structure of NaF