

a

The three types of chemical bonding are...

- _____
- _____
- _____

Describe the movement and arrangement of subatomic particles in each of the above.

- _____
- _____
- _____

d

Using this example, draw dot and cross diagrams for H₂O, NH₃ and O₂

- H₂O
- NH₃
- O₂

f

Complete the polymer diagram for the following monomer.

What is a monomer?

What is a polymer?

h

Match up the following with the state symbol.

solid	(g)
liquid	(l)
gas	(s)
solution	(aq)

What happens to the intermolecular forces when a liquid turns into a gas?

b

Draw a dot and cross diagram for the following ionic bonding:
sodium chloride

Which four groups are more likely to make ions?

e

Describe how metals conduct heat and electricity. Use the diagram to help explain.

g

Properties of metals and alloys.

Describe how the 2 pictures are different to each other.

Why are some alloys harder than pure metals?

i

Describe the changes of state during:

evaporation:

condensation:

melting:

c

Describe the bonding in ionic compounds

Why can ionic compounds conduct electricity when in solution?

j

Small molecules form substances with **high/low** boiling points because they have **strong/weak** intermolecular forces.

They **do/do not** conduct electricity because they do not have any free electrons.

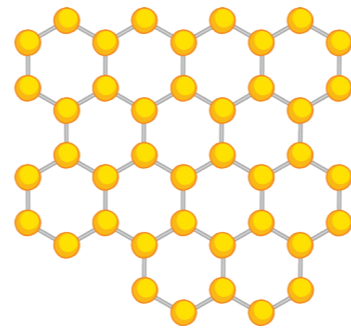
a

Draw a diagram of the structure of diamond.

Why is this structure so strong? Choose the correct answer.

1. Many strong ionic bonds.
2. Many strong covalent bonds.
3. Many strong metallic bonds.

f



_____ is a single layer of graphite.

Why is this material so strong?

Where is this product used?

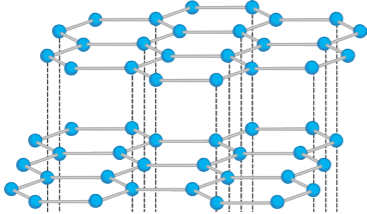
i

What are the formulas for the following?
Match up the answers.

Iron (II) oxide	$\text{Fe}(\text{OH})_2$
Iron (II) hydroxide	FeO
Iron (III) oxide	Fe_2O_3

b

What is this a diagram of?



Explain why it can conduct electricity and heat.

j

How many:

mm in 1m? _____

m in 1mm? _____

What are the abbreviated units for the following:

metre; _____

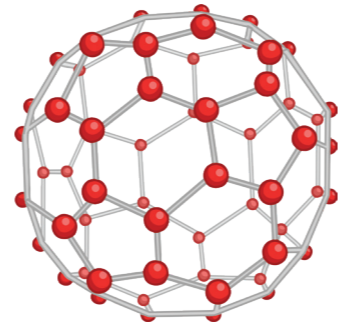
centimetre; _____

millimetre; _____

nanometre; _____

micrometre. _____

g



What is this structure?

How many carbon atoms are there?

a) 20 b) 30 c) 40 d) 50 e) 60

k

Compare diamond and graphite.
Describe the structure, hardness and conductivity.

c

What is **nanoscience**?

l

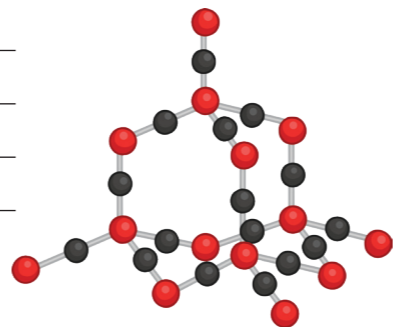
Name **four** uses of nanoparticles.

d

Why do the properties of a material made from nanoparticles change when it is in bulk?

h

Explain the differences and similarities between silicon dioxide and diamond.



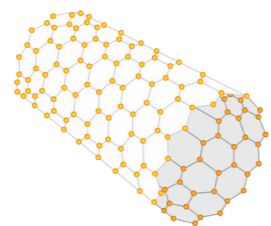
m

Explain why nanoparticles can be potentially harmful to human health.

e

This is a carbon _____.

It has high _____ strength, high _____ and _____ conductivity.



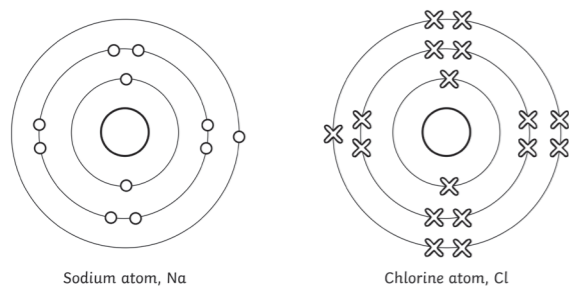
The three types of chemical bonding are...

1. ionic
2. covalent
3. metallic

Describe the movement and arrangement of subatomic particles in each of the above.

1. Electrons are lost and gained to fill the outer shell.
2. Electrons are shared to fill the outer shell.
3. Positive metal ions are surrounded by free electrons.

Draw a dot and cross diagram for the following ionic bonding:
sodium chloride



Which four groups are more likely to make ions?

1, 2, 6 and 7

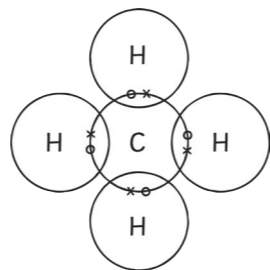
Describe the bonding in ionic compounds

They are held together by the strong ionic forces of oppositely charged ions. Metal ions have a positive charge and non-metals ions have a negative charge so they are attracted. They have very strong bonds.

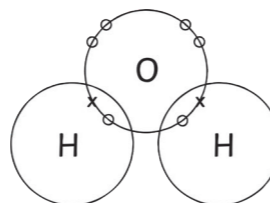
Why can ionic compounds conduct electricity when in solution?

The ions are free to move about and can conduct electricity.

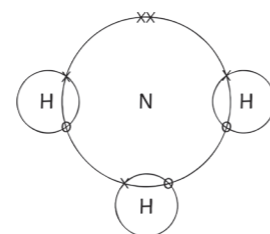
Using this example, draw dot and cross diagrams for H₂O, NH₃ and O₂



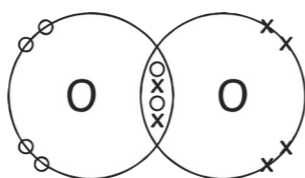
1. H₂O



2. NH₃



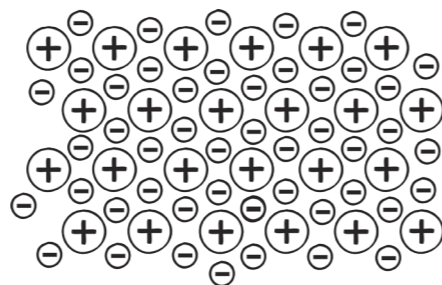
3. O₂



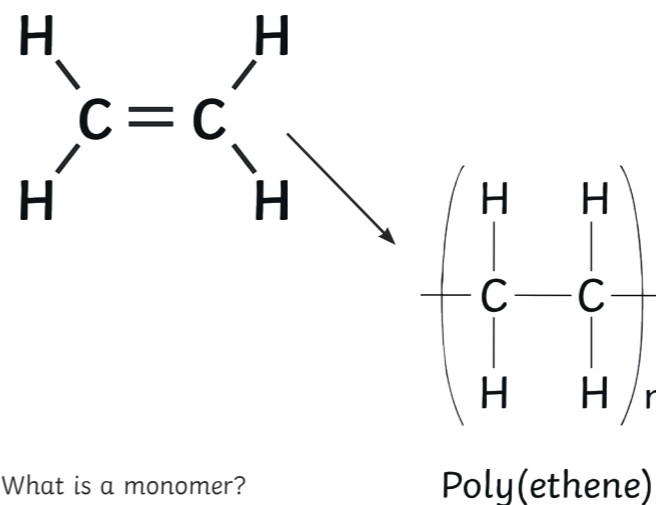
Describe how metals conduct heat and electricity.

Use the diagram to help explain.

Metals have free electrons that are able to move around and transfer energy.



Complete the polymer diagram for the following monomer.



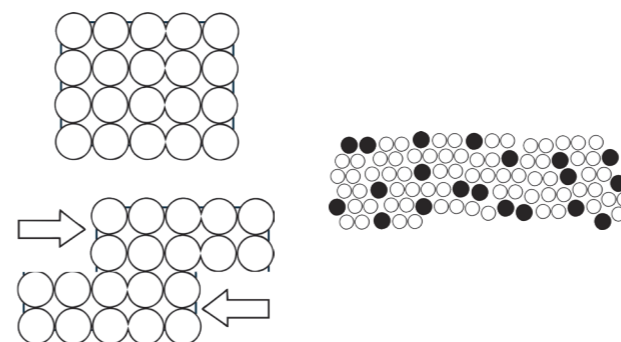
What is a monomer?

One molecule.

What is a polymer?

A long chain of monomers.

Properties of metals and alloys.



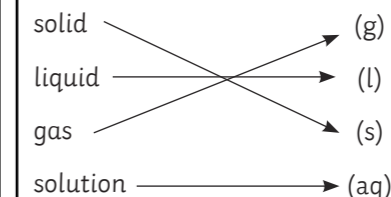
Describe how the 2 pictures are different to each other.

Alloys have different sized particles. In pure metals, all the atoms are the same.

Why are some alloys harder than pure metals?

They have different sized particles so the layers can not slide across each other as easily.

Match up the following with the state symbol.



What happens to the intermolecular forces when a liquid turns into a gas?

The forces of attraction become less as the particles gain energy and move about more.

Describe the changes of state during:

evaporation:

liquid changes to a gas.

condensation:

gas changes to a liquid.

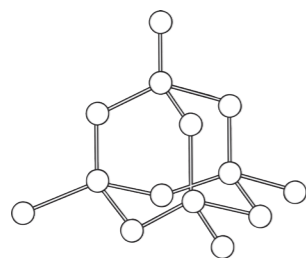
melting:

solid changes to a liquid.

Small molecules form substances with **low** boiling points because they have **weak** intermolecular forces.

They **do not** conduct electricity because they do not have any free electrons.

Draw a diagram of the structure of diamond.

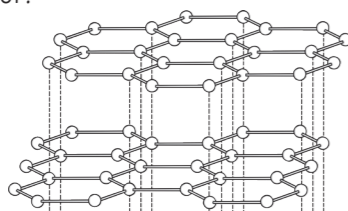


Why is this structure so strong? Choose the correct answer.

1. Many strong ionic bonds.
2. **Many strong covalent bonds.**
3. Many strong metallic bonds.

What is this a diagram of?

Graphite



Explain why it can conduct electricity and heat.

Graphite has free delocalised electrons that can pass between layers; the electrons can carry the charge.

What is **nanoscience**?

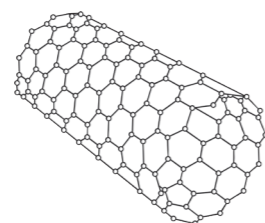
The study of very small particles: 1 to 100nm diameter.

Why do the properties of a material made from nanoparticles change when it is in bulk?

This is because of the high surface area to volume ratio.

This is a carbon **nanotube**.

It has high **tensile** strength, high **heat** and **electrical** conductivity.



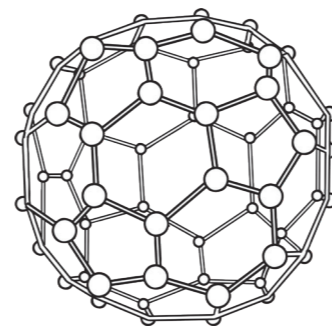
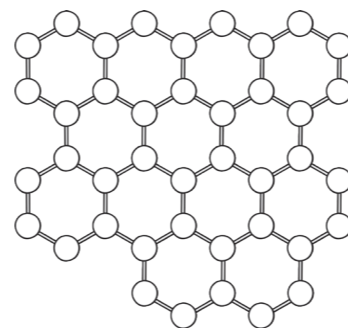
Graphene is a single layer of graphite.

Why is this material so strong?

It has strong covalent bonds.

Where is this product used?

In electronics and composites. _



What is this structure?

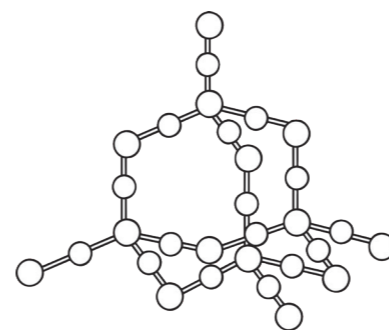
Buckminsterfullerene

How many carbon atoms are there?

e) 60

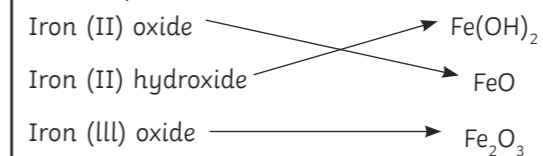
Explain the differences and similarities between silicon dioxide and diamond.

Silicon dioxide contains silicon and oxygen atoms instead of carbon but has a similar structure to diamond.



What are the formulas for the following?

Match up the answers.



How many:

mm in 1m? **1000mm**

m in 1mm? **0.001m**

What are the abbreviated units for the following:

metre; **m**

centimetre; **cm**

millimetre; **mm**

nanometre; **nm**

micrometre. **µm**

Compare diamond and graphite.

Describe the structure, hardness and conductivity.

Both – forms of carbon.

Single covalent bonds

Have many atoms.

Graphite – flat sheets, conducts electricity, each carbon atom forms 3 covalent bonds.

Diamond – tetrahedral structure, each carbon atom forms 4 covalent bonds, does not conduct electricity.

Name **four** uses of nanoparticles.

Two from: medicine, electronics, cosmetics, sun creams, deodorants, catalysts.

Explain why nanoparticles can be potentially harmful to human health.

The properties of nanoparticles are different to the properties of the same material in bulk. It is difficult for scientists to know how they will behave through studying the material that the nanoparticle has come from.

