

Properties of mixtures :

Q1. (2018)

2 Which of these general properties correctly describes a metal?

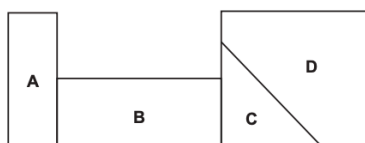
- A Ductile and good conductor of heat
- B High density and forms negative ions
- C Malleable and low density
- D Shiny and brittle

Your answer ☐

[1]

Q2. (2018)

4 This is a section of the Periodic Table.



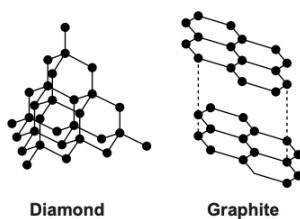
In which section of the Periodic Table would you find **non-metals**?

Your answer ☐

[1]

Q3. (2018)

21 The diagrams show the structures of diamond and graphite.



One property of diamond is that it is very hard. One property of graphite is that it is slippery.

(A)

(a) Write about the other properties of diamond and graphite.

Diamond

.....

Graphite

..... [4]

Q4. (2019)

22 Lithium is a metal found in Group 1 of the Periodic Table.

(A)

- (b) An alloy is a mixture of a metal with one or more other elements.

When lithium is mixed with aluminium it makes an alloy that can be used in aircraft.

Adding different amounts of lithium to the aluminium changes the properties of the alloy.

Alloy	Percentage of lithium (%)	Density (g/cm ³)	Melting point (°C)	Strength (MPa)
A	2.00	2.58	670	550
B	2.20	2.56	580	555
C	2.45	2.55	655	565

A scientist thinks that alloy C is best for making an aircraft.

Is she correct?

Explain your answer using evidence from the table.

.....

 [2]

Q5. (2020)

- 8 Ammonia has a simple molecular structure.

Which statement explains why ammonia has a low melting point and a low boiling point?

- A The covalent bonds between the atoms are strong.
 B The covalent bonds between the atoms are weak.
 C The intermolecular forces between the molecules are strong.
 D The intermolecular forces between the molecules are weak.

Your answer ☐

[1]

Q6. (2020)

- 15 Substance Y melts at -7 °C and boils at 59 °C.

What is the state of substance Y at room temperature?

- A Gas
 B Liquid
 C Plasma
 D Solid

Your answer ☐

[1]

Q7. (2020)

- 16 The particle model shows how particles are arranged and how they move in the three states of matter.

(A)

- (b) The table shows the properties of different substances.

Substance	Melting point (°C)	Boiling point (°C)	Soluble in water?	Conducts electricity in solid state?	Conducts electricity in molten state?
A	-210	-196	No	No	No
B	1084	2562	No	Yes	Yes
C	605	1137	Yes	No	Yes
D	-78	-34	Yes	No	No

(i)

Which **two** substances are gases at room temperature?

Tick (✓) **two** boxes.

A ☐

B ☐

C ☐

D ☐

[1]

(ii)

Substance **C** is an ionic substance.

Use the information in the table to explain why.

.....

 [2]

Q8. (2020)

22 This question is about structure and bonding.

(A)

(b) Look at the structure of a metal in **Fig. 22.2**. Metals are malleable, which means they can be hammered or pressed into shape without breaking or cracking.

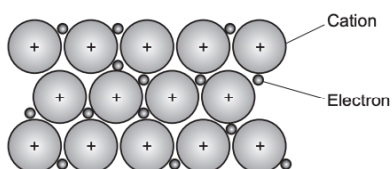


Fig. 22.2

Explain why metals are **malleable**.

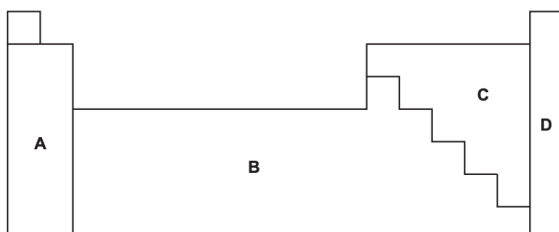
.....

 [2]

Q9. (2023)

6 An element **gains** electrons to form a full outer shell.

Which part of the Periodic Table will the element be from?



Your answer ☐

[1]

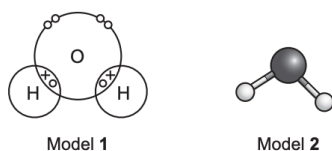
Q10. (2023)

18 Molecules can be shown by different models.

(A)

- (b) A student wants to use a model to show the **location of the electrons** in a water molecule as shown in **Fig. 18.1**.

Fig. 18.1



Explain why the student uses model 1 instead of model 2.

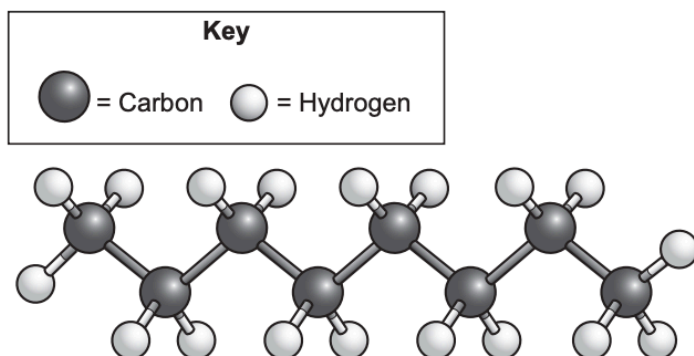
.....

 [2]

(B)

- (c) Fig. 18.2 shows a model of octane.

Fig. 18.2



(i)

- (i) What is the **empirical formula** of octane?

..... [1]

(ii)

- (ii) Calculate the **relative formula mass** of octane.

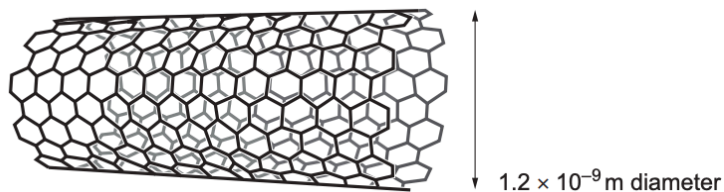
Relative atomic mass (A_r): C = 12.0 H = 1.0.

Relative formula mass = ... [3]

(C)

(d) Fig. 18.3 shows a model of a carbon nanotube.

Fig. 18.3



(i)

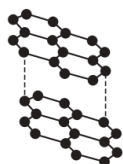
(i) What is the diameter of the carbon nanotube in **nanometres**?

..... [1]

(ii)

(ii) Fig. 18.4 shows a model of the structure and bonding in graphite.

Fig. 18.4



Explain why the carbon nanotube is stronger than graphite.

Use Fig. 18.3 and Fig. 18.4.

.....

 [2]

(iii)

(iii) A hydrogen atom has a diameter of 2.4×10^{-10} m.

Calculate how many times larger the carbon nanotube is than the hydrogen atom.

Number of times larger = ... [2]

Q11. (2023)

19 The table shows the type of bonding in three substances.

Substance	Type of bonding
Bromine, Br ₂	simple molecular (covalent)
Sodium chloride, NaCl	ionic
Diamond, C	giant covalent

(A)

(a)* Describe and compare the types of bonding in these three substances.

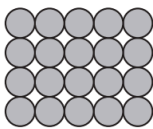
Predict which substance will have the lowest melting point.

[6]

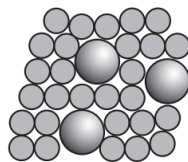
. [6]

(B)

(b) Titanium is a metal element. Metal **elements** can be mixed with other elements to form metal **alloys**.



Metal element



Metal alloy

(i)

(i) Explain why a metal alloy is harder than a metal element.

.....

.....

.....

... [2]

(ii)

(ii) In medicine, titanium alloys are used in hip replacements.

The table shows some properties of alloys. Tensile strength is the amount of load a material can take before it breaks.

Alloy	Density (g/cm³)	Tensile strength (MPa)	Does it contain any toxic elements?
1	4.43	950	yes
2	4.52	950	no
3	5.70	546	no

Which alloy would be best to use in a hip replacement? Explain your answer.

Alloy

Reason

[3]