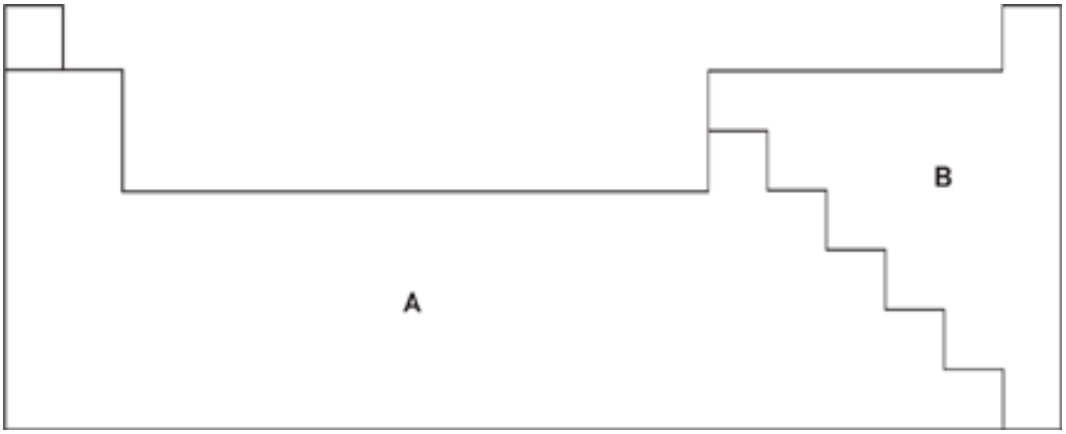
1(a). A Periodic Table is shown with two sections, **A** and **B**.



An element, **X**, is shiny and conducts electricity.

State and explain if element **X** is found in section **A** or **B**.

In your answer, describe the differences in the **physical** properties of elements in sections **A** and **B**.

[6]

(b). In his Periodic Table, Mendeleev noticed that when elements were arranged in order of atomic mass, some elements seemed to be in the wrong place.

Complete the sentences about Mendeleev's Periodic Table.

Use words from the list.

had the wrong mass	**left gaps for**	**neutrons**	**properties**
reweighed	**were undiscovered**		

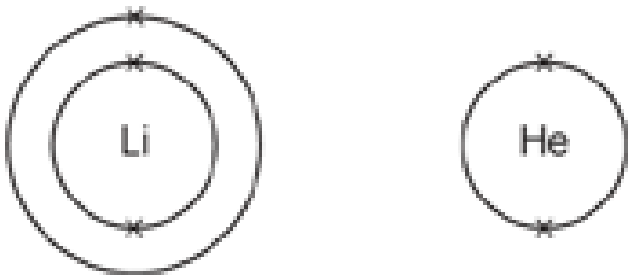
Mendeleev grouped the elements according to their ..... .

He predicted that some elements ..... .

He ..... these elements.

[3]

(c). Lithium is in Group 1 of the Periodic Table and helium is in Group 0.



Explain why Group 1 elements are reactive, but Group 0 elements are unreactive.

[2]

2. Plastics are polymers. Polymers have covalent bonds between the atoms.

i. Explain what a **covalent bond** is in terms of electrons.

[1]

ii. Describe **two** differences between a polymer used to make a plastic bag and a polymer used to make a plastic bottle.

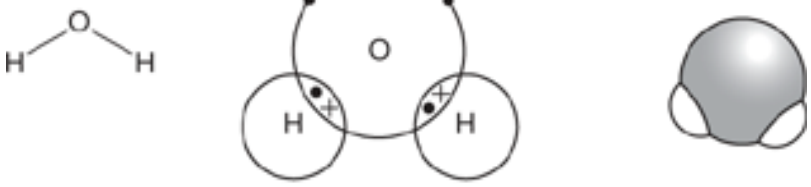
1 _____

_____

2 _____

_____ **[2]**

3. A water molecule can be represented with different models.



Model 1 **Model 2** **Model 3**

Which model would you use to show the **volume** of a water molecule?

Explain your answer.

Model _____

Reason _____

_____ **[2]**

4. Sodium chloride, NaC*l*, is an ionic compound.

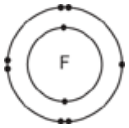
How are the ions held together in sodium chloride?

A Covalent bonds
B Delocalised electrons
C Electrostatic forces
D Intermolecular forces

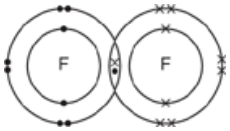
Your answer ☐ **[1]**

5. Which dot and cross diagram shows the structure of a fluorine molecule, F_2?

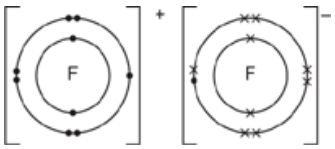
A



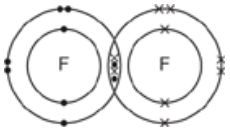
B



C



D



Your answer ☐ **[1]**

6. Which group of elements on the Periodic Table has a full outer shell of electrons?

A 0
B 1
C 2
D 7

Your answer ☐ **[1]**

7. Chlorine is in Period 3 and Group 7 of the Periodic Table.

Which statements about chlorine are **correct**?

Tick (✓) **two** boxes.

Chlorine forms negative ions. ☐
Chlorine has 3 electrons in its outer shell. ☐
Chlorine has 7 electron shells. ☐
Chlorine has 7 electrons. ☐
Chlorine is a metal. ☐
Chlorine is a non-metal. ☐

[2]

8. 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

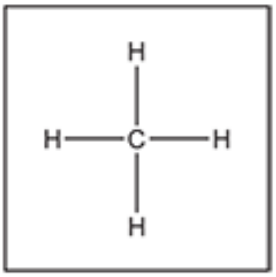
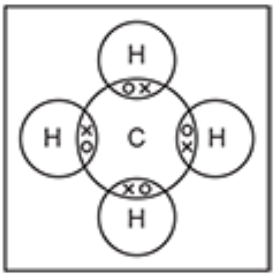
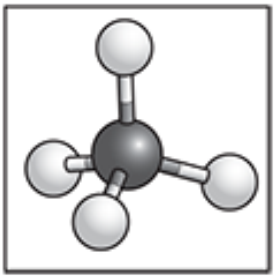
Describe and compare the types of bonding in these three substances.

Predict which substance will have the lowest melting point.

[6]

9(a). Molecules can be shown by different models.

Draw **three** lines to connect each **name** to its correct **model**.

Name	Model
Ball and stick model	
Dot and cross diagram	
3D Space-filling model	
	

[3]

(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**.

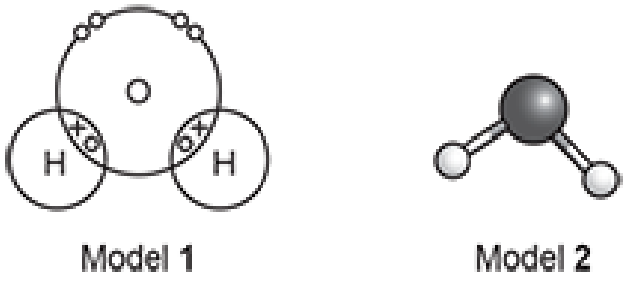


Fig. 18.1

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

[2]

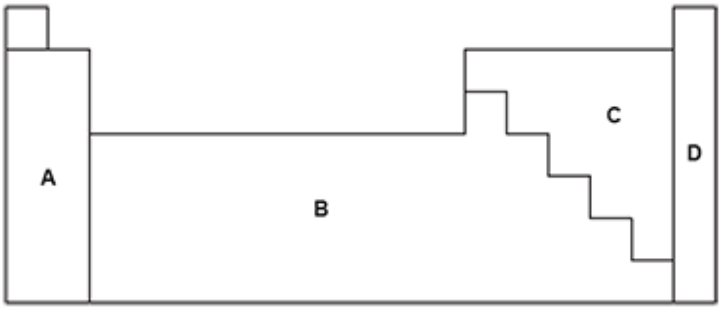
10. What changes did Mendeleev make to improve his Periodic Table?

A He arranged elements by mass number.
B He arranged elements by the number of neutrons.
C He put elements with low melting points on the left and high melting points on the right.
D He realised some elements had not yet been discovered so left spaces for them.

Your answer ☐ **[1]**

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

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



Your answer ☐ **[1]**

12. The table shows information about the physical properties of four elements, **W**, **X**, **Y** and **Z**.

	W	**X**	**Y**	**Z**
Density (g / cm^3)	0.97	7.87	0.003	1.74
Melting point (°C)	98	1538	–102	650
Conducts electricity?	✓	✓	✗	✓

Which element is a non-metal?

Give a reason for your answer.

Element _____

Reason _____ **[2]**

13. A scientist investigates some metals and metal alloys.

i. Describe the structure and bonding in a metal.

You can include a labelled diagram in your answer.

_____

_____

_____

_____

[3]

ii. Explain why metals are malleable.

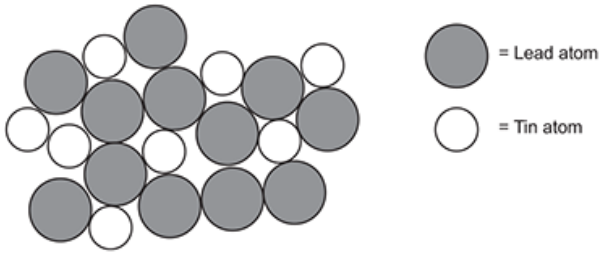
_____

[1]

iii. Explain why metals can conduct electricity

[2]

iv. The scientist has a diagram of one type of metal alloy as shown.



What is the smallest ratio of lead to tin in the alloy?

Ratio of lead to tin = ... **[2]**

v. The table shows data about other alloys made from tin, copper and silver.

	Alloy 1	**Alloy 2**	**Alloy 3**
Tin content (%)	95.5	99.0	96.5
Copper content (%)	0.7	0.7	0.5
Silver content (%)	3.8	0.3	3.0
Melting point (˚C)	217	227	220

What is the relationship between the silver content and the melting point?

[1]

14. Mendeleev swapped the positions of the elements tellurium and iodine when he was creating his Periodic Table. This meant that the atomic masses were not in order.

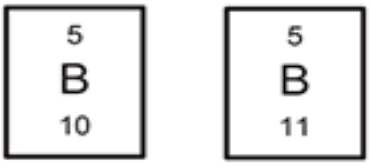
Why were the atomic masses not in order?

A He developed his table without knowing about atomic structure.
B He measured the atomic masses incorrectly.
C He left gaps for undiscovered elements.
D He put the elements in order of increasing reactivity.

Your answer ☐ **[1]**

15(a).

i. Look at the information about two **isotopes** of boron.



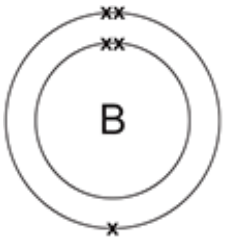
Which statements about the isotopes of boron are correct?

Tick (✓) **two** boxes.

Boron has 11 protons. ☐
The atomic number of boron is 5. ☐
The electrons are heavier than the protons. ☐
The isotopes of boron have different numbers of neutrons. ☐
The isotopes of boron have different numbers of protons. ☐
The mass number of boron is the same for both isotopes. ☐

[2]

ii. The diagram shows a boron atom.



Explain why boron is in Group 3 of the Periodic Table.

_____

_____ **[1]**

(b). Chlorine is in Group 7 of the Periodic Table. Chlorine is a non-metal.

Why do non-metals form negative ions?

_____

_____

_____ **[2]**

16. Which is correct about any two elements with the **same** number of electron shells?

A They are both metals.
B They are both non-metals.
C They are both in the same group on the Periodic Table.
D They are both in the same period on the Periodic Table.

Your answer ☐ **[1]**

END OF QUESTION PAPER