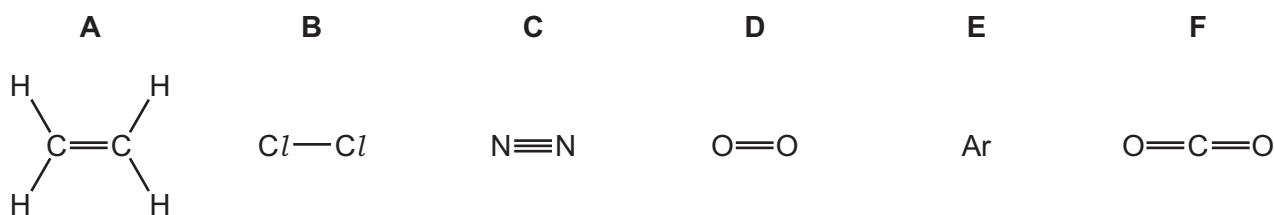


1 The structures of six gases are shown below.



Give a use for gas E.

..... [1]

[Total: 1]

2 The table shows some properties of the Group 0 elements helium, neon, argon and krypton.

element	electron arrangement	density of the liquefied gas in g/cm^3	melting point / $^{\circ}\text{C}$	boiling point / $^{\circ}\text{C}$
helium	2	0.15	-272	-269
neon		1.20	-248	-245
argon	2,8,8	1.40	-189	-186
krypton	2,8,18,8	2.15	-157	-152

Describe how the density of the liquefied noble gases changes down Group 0.

..... [1]

[Total: 1]

3 Helium and hydrogen can both be used to fill balloons.

Suggest **one** advantage of using helium rather than hydrogen to fill balloons.

..... [1]

[Total: 1]

4 Helium, neon and argon are noble gases.

(a) Explain, in terms of the electronic structure, why neon is unreactive.

.....
 [1]

(b) State **one** use of argon.

..... [1]

[Total: 2]

5 Argon is present in clean, dry air.

(a) Give **one** use of argon.

..... [1]

(b) Which **two** of the following statements about argon are correct?
 Tick **two** boxes.

Argon is unreactive.

Argon is diatomic.

Argon is monatomic.

Argon forms ionic compounds.

Argon is a greenhouse gas.

[2]

[Total: 3]

6 Give **one** use of argon.

..... [1]

[Total: 1]

7 The following are the symbols and formulae of some elements and compounds.

Ar Ca(OH)₂ Cl₂ CO₂ Cu Fe SO₂ V₂O₅

State which element or compound in the list is used as an inert atmosphere in lamps.

..... [1]

[Total: 1]

8 This question is about the elements in Period 3 of the Periodic Table.

Na	Mg	Al	Si	P	S	Cl	Ar
----	----	----	----	---	---	----	----

State which Period 3 element provides an inert atmosphere in lamps.

..... [1]

[Total: 1]

9 The following substances are gases at room temperature.

letter	A	B	C	D	E	F	G	H
substance	SO ₂	Ar	CO	Cl ₂	NH ₃	CO ₂	CH ₄	C ₃ H ₈

Identify, by letter:

a gas which is used as an inert atmosphere in lamps [1]

[Total: 1]

10 Part of the Periodic Table is shown.

Which element is a gas that does **not** form a compound with potassium?

[1]

[Total: 1]

- 11** The noble gases, which are in Group 0 of the Periodic Table, are all very1..... .
2....., one of these gases, is used to provide an inert atmosphere in lamps.
 Another,3....., is used for filling balloons because it is less dense than air.
 Which words complete the sentences about noble gases?

	1	2	3
A	reactive	argon	helium
B	reactive	helium	argon
C	unreactive	argon	helium
D	unreactive	helium	argon

[1]

[Total: 1]

- 12** The following statements are about elements in the Periodic Table.

- 1 Their atoms have a full outer shell of electrons.
- 2 They form basic oxides.
- 3 They are found in Group 0.
- 4 They are present in small quantities in the air.

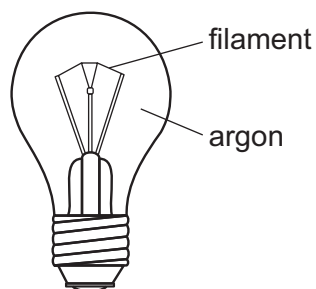
Which statements are correct for the noble gases?

- A** 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

[1]

[Total: 1]

13 The diagram shows a light bulb.



Why is argon used instead of air in the light bulb?

- A Argon is a good conductor of electricity.
- B Argon is more reactive than air.
- C The filament glows more brightly.
- D The filament does not react with the argon.

[1]

[Total: 1]

14 Elements in Group 0 of the Periodic Table have uses.

These noble gases are1..... and this explains why argon2..... be used in lamps.

Which words correctly complete gaps 1 and 2?

	1	2
A	reactive	can
B	reactive	cannot
C	unreactive	can
D	unreactive	cannot

[1]

[Total: 1]

15 Period 3 of the Periodic Table is shown.

sodium	magnesium	aluminium	silicon	phosphorus	sulfur	chlorine	argon
--------	-----------	-----------	---------	------------	--------	----------	-------

Answer the following questions using only these elements.

Each element may be used once, more than once or not at all.

State which element:

(a) is a gas at room temperature and pressure

..... [1]

(b) forms a basic oxide with a formula of the form X_2O

..... [1]

(c) is made of atoms which have a full outer shell of electrons

..... [1]

(d) forms an oxide which causes acid rain

..... [1]

(e) is extracted from bauxite

..... [1]

(f) forms an oxide which has a macromolecular structure

..... [1]

(g) consists of diatomic molecules.

..... [1]

[Total: 7]

16 The names of nine gases are given.

ammonia

carbon monoxide

chlorine

ethane

ethene

helium

hydrogen

neon

oxygen

State which gas is a monatomic gas with ten protons in its nucleus.

..... [1]

[Total: 1]

17 The names of seven gases are given.

ammonia

ethene

helium

hydrogen

hydrogen chloride

methane

nitrogen

State which gas is monatomic.

..... [1]

[Total: 1]

18 The names of eight gases are given.

ammonia

argon

carbon dioxide

helium

hydrogen

methane

neon

sulfur dioxide

State which gas is a monatomic gas which has atoms with the electronic structure 2,8,8.

..... [1]

[Total: 1]

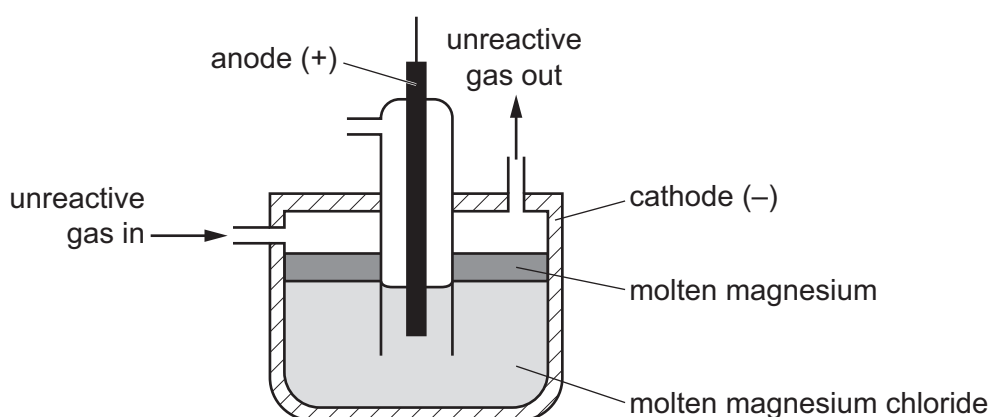
19 Explain why helium and **not** hydrogen is used to fill party balloons.

.....

..... [1]

[Total: 1]

20 Magnesium is manufactured by the electrolysis of molten magnesium chloride.



(a) What information in the diagram shows that molten magnesium is less dense than molten magnesium chloride?

..... [1]

(b) One of the products of this electrolysis is magnesium.

State the name of the other product.

..... [1]

An unreactive gas is blown over the surface of the molten magnesium.

(c) Suggest why an unreactive gas and **not** air is blown over the surface of the molten magnesium.

..... [1]

(d) Suggest the name of an unreactive gas which could be used.

..... [1]

[Total: 4]

21 Dry air contains mainly nitrogen, noble gases and oxygen.

(a) Which **one** of the following shows the correct composition of dry air?
Tick **one** box.

nitrogen 21%, oxygen 78%, noble gases 1%

nitrogen 1%, oxygen 78%, noble gases 21%

nitrogen 69%, oxygen 21%, noble gases 10%

nitrogen 78%, oxygen 21%, noble gases 1%

[1]

(b) Metals can be joined together by high temperature welding.
This process is sometimes carried out in the presence of argon.
Suggest why welding is carried out in the presence of argon.

.....

..... [2]

[Total: 3]

22 Titanium is extracted from an ore called rutile. Rutile is an impure form of titanium(IV) oxide, TiO_2 .

Rutile is mixed with coke and heated in a furnace through which chlorine gas is passed. The product is gaseous titanium(IV) chloride, TiCl_4 .

Titanium(IV) chloride is heated with an excess of magnesium, in an atmosphere of argon.

- (a) Balance the chemical equation for the reaction.



- (b) Titanium(IV) chloride can be reacted with sodium instead of magnesium.

The reaction between titanium(IV) chloride and sodium is similar to the reaction between titanium(IV) chloride and magnesium.

Write a chemical equation for the reaction between titanium(IV) chloride and sodium.

..... [1]

- (c) Suggest why the reaction between titanium(IV) chloride and magnesium is done in an atmosphere of argon and **not** in air.

.....
..... [1]

[Total: 3]