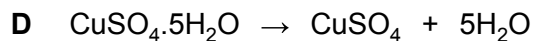
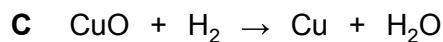
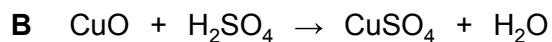
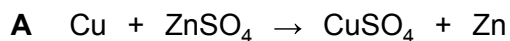


1 Which reaction is reversible?

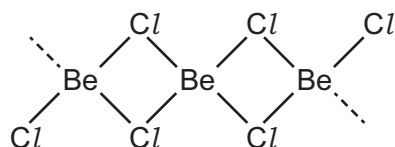


[1]

[Total: 1]

2 Beryllium is in Group II and Period 2 of the Periodic Table.

Part of the structure of beryllium chloride is shown below.



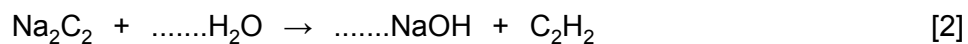
Deduce the simplest formula for beryllium chloride.

..... [1]

[Total: 1]

3 Sodium carbide, Na_2C_2 , reacts with water to form ethyne, C_2H_2 .

(a) Complete the symbol equation for this reaction.



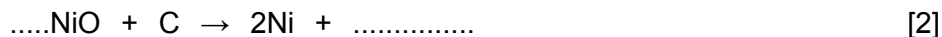
(b) Calculate the relative formula mass of sodium carbide.

[1]

[Total: 3]

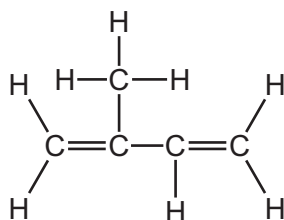
- 4 Nickel is extracted from nickel(II) oxide, NiO, by heating with carbon.

Complete the symbol equation for this reaction.



[Total: 2]

- 5 When rubber is distilled, a chemical called isoprene is formed. The structure of isoprene is shown below.

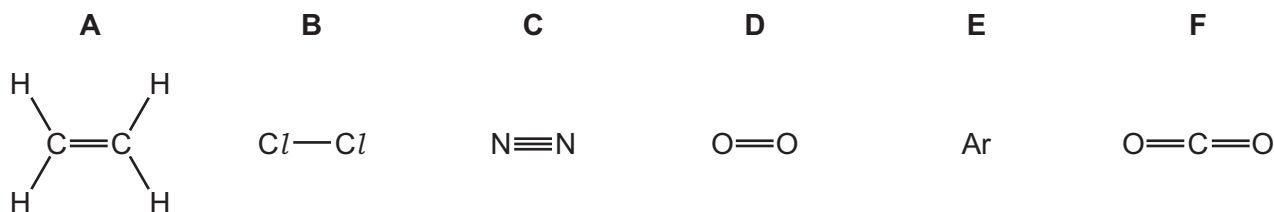


Deduce the molecular formula of isoprene.

..... [1]

[Total: 1]

- 6 The structures of six gases are shown below.



When magnesium is heated in gas **C** magnesium nitride, Mg₃N₂, is formed.

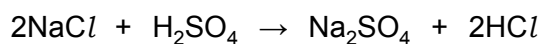
Complete the symbol equation for this reaction.



[Total: 1]

- 7 Hydrogen chloride can be prepared in the laboratory by heating sodium chloride with concentrated sulfuric acid.

The equation for the reaction is shown below.

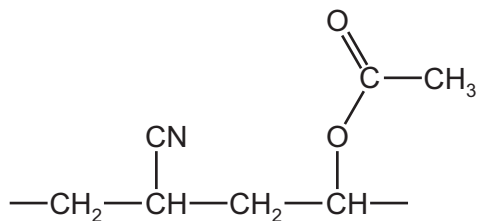


State the name of the salt formed as a product in this reaction.

..... [1]

[Total: 1]

- 8 The structure of part of a plastic is shown below.



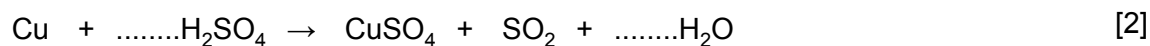
How many different types of atom are present in this plastic?

..... [1]

[Total: 1]

- 9 Sulfur dioxide can be formed when copper is reduced by hot concentrated sulfuric acid.

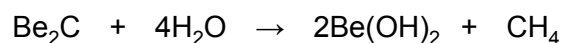
Complete the symbol equation for this reaction.



[Total: 2]

- 10 Beryllium is in Group II and Period 2 of the Periodic Table.

Beryllium carbide, Be_2C , reacts with water. Beryllium hydroxide and methane are formed.

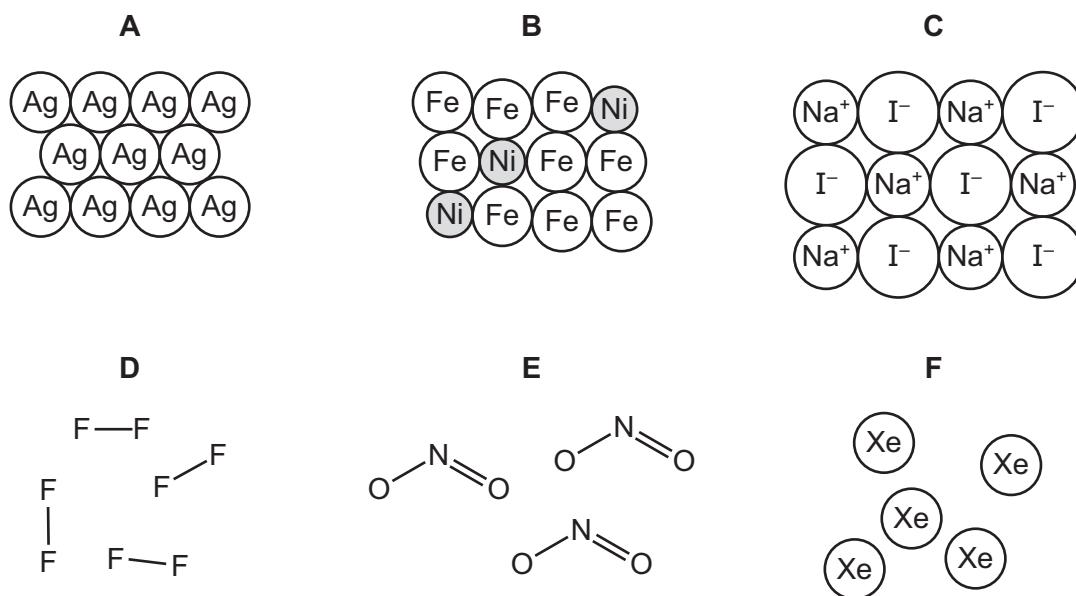


Calculate the relative formula mass of beryllium hydroxide.

[2]

[Total: 2]

- 11 The structures of six substances are shown below.



(a) Substance **A** is an element.

What is meant by the term *element* ?

.....
 [1]

(b) Substance **D** oxidises water to oxygen.

Complete the symbol equation for this reaction.

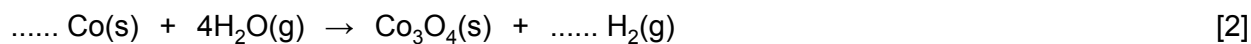


[Total: 3]

12 Cobalt is a transition element.

When it is heated very strongly in steam, hydrogen is given off.

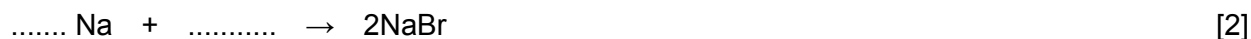
Complete the symbol equation for this reaction.



[Total: 2]

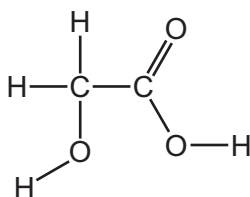
13 Sodium bromide can be made by heating sodium in bromine vapour.

Complete the balanced symbol equation for this reaction.



[Total: 2]

- 14 The structure of glycolic acid is shown below.



Glycolic acid is prepared by heating a mixture of methanal, carbon monoxide and water with a sulfuric acid catalyst.

The formula of methanal is HCHO.

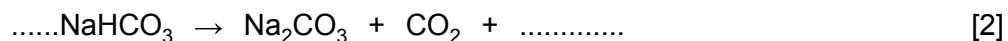
Calculate the relative molecular mass of methanal.

[1]

[Total: 1]

- 15 When sodium hydrogen carbonate is heated at 60 °C, carbon dioxide is given off.

- (a) Complete the equation for this reaction.



- (b) What type of chemical reaction is this?

Tick **one** box.

addition

neutralisation

oxidation

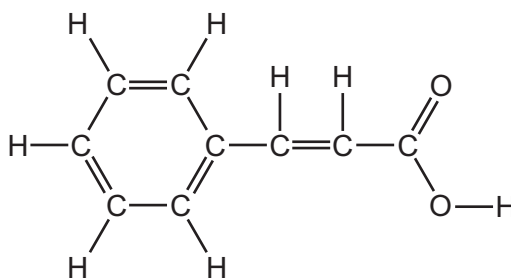
thermal decomposition

[1]

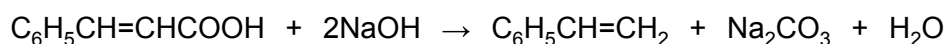
[Total: 3]

16 Cinnamic acid is found in plants called balsams.

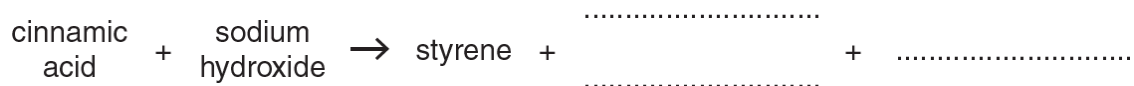
The structure of cinnamic acid is shown below.



Cinnamic acid reacts with sodium hydroxide to form styrene.



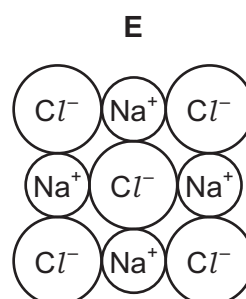
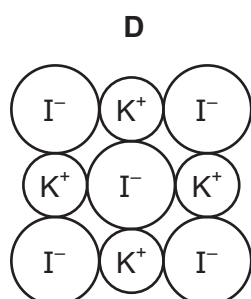
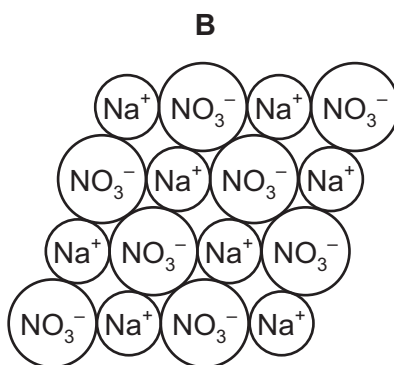
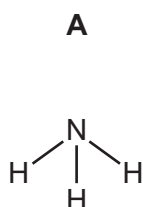
Complete the word equation for this reaction.



[2]

[Total: 2]

17 The structures of five substances are shown below.



Give the name of compound **B**.

..... [1]

[Total: 1]

- 18 Bromine reacts with fluorine to form bromine trifluoride, BrF₃.

Calculate the relative molecular mass of bromine trifluoride.

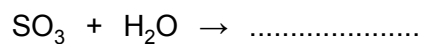
Show all your working.

[2]

[Total: 2]

- 19 Sulfur trioxide dissolves in water to form sulfuric acid.

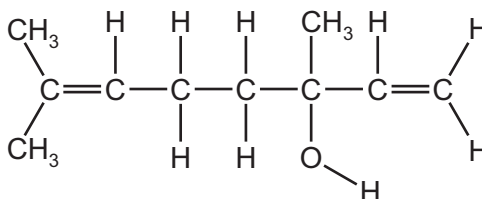
Complete the symbol equation for this reaction.



[1]

[Total: 1]

- 20 Linalool is a compound found in the seeds of the coriander plant.
The formula of linalool is shown below.

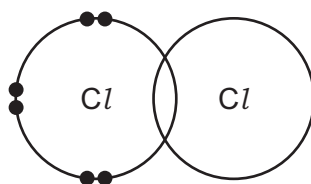


How many different elements are there in one molecule of linalool?

..... [1]

[Total: 1]

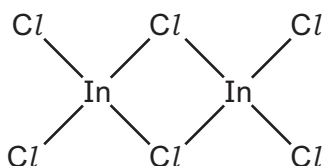
- 21 Complete the diagram below to show the arrangement of electrons in a molecule of chlorine.



[2]

[Total: 2]

- 22 Chlorine reacts with indium, In, to form a chloride with the formula shown below.

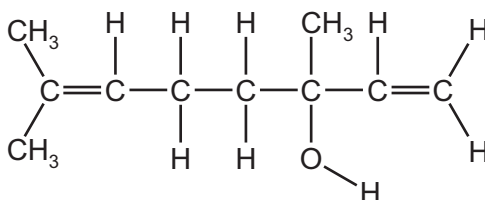


Give the molecular formula for this chloride.

..... [1]

[Total: 1]

- 23 Linalool is a compound found in the seeds of the coriander plant. The formula of linalool is shown below.



How many carbon atoms are there in one molecule of linalool?

..... [1]

[Total: 1]

- 24 Two of the elements present in a sample of coal are carbon and sulfur.

A sample of coal was heated in the absence of air and the products included water, ammonia and hydrocarbons.

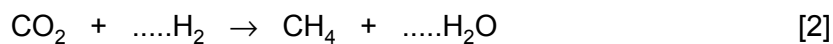
Name **three** other elements present in this sample of coal.

..... [2]

[Total: 2]

- 25** During the fermentation of animal and vegetable waste, carbon dioxide reacts with hydrogen to produce methane and water.

Complete the chemical equation for this reaction.



[Total: 2]

- 26** The table shows the percentage by mass of the elements on Earth and in the Universe.

element	percentage by mass on Earth	percentage by mass in the Universe
helium	0.1	21.0
hydrogen	0.1	76.0
iron	35.0	1.0
magnesium	14.0	0.1
oxygen	29.0	0.8
silicon	14.0	0.1
sulfur	2.9	0.1
other elements		0.9
total	100.0	100.0

Answer these questions using only the information in the table.

- (a)** Deduce the percentage by mass of other elements present on Earth.

..... % [1]

- (b)** Which non-metallic element is present on Earth in the greatest percentage by mass?

..... [1]

- (c) Give **two** major differences in the percentage by mass of the elements on Earth and in the Universe.

1

.....

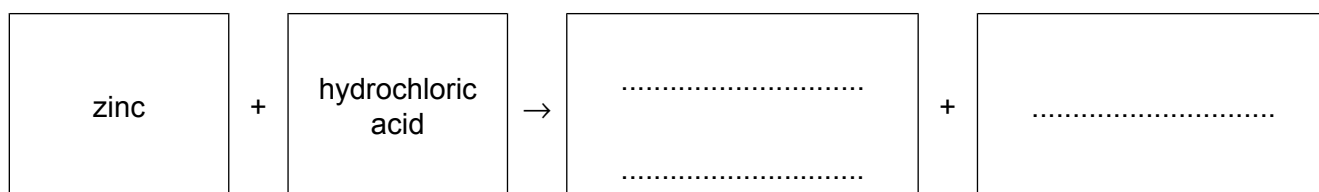
2

..... [2]

[Total: 4]

- 27** Dilute hydrochloric acid reacts with zinc.

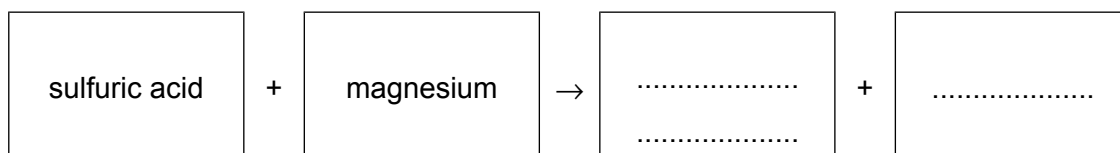
Complete the word equation for this reaction.



[2]

[Total: 2]

- 28** Complete the word equation for the reaction of dilute sulfuric acid with magnesium.



[2]

[Total: 2]

- 29** Lithium reacts with oxygen to form lithium oxide.

Balance the chemical equation for this reaction.



[Total: 2]

- 30** The table shows the percentage by mass of the elements in the oceans and in the biosphere. The biosphere is all living organisms.

element	percentage by mass in the oceans	percentage by mass in the biosphere
calcium	0.05	0.40
carbon	0.01	39.00
chlorine	1.80	0.05
hydrogen	11.00	6.60
magnesium	0.12	0.10
oxygen	85.80	53.00
silicon	0.00	0.10
sodium	1.15	0.05
other elements	0.07	
total	100.00	100.00

Answer these questions using only the information in the table.

(a) Deduce the percentage by mass of other elements present in the biosphere.

..... % [1]

(b) Which metallic element is present in the oceans in the greatest percentage by mass?

..... [1]

(c) Give **two** major differences in the percentage by mass of the elements in the oceans and in the biosphere.

1

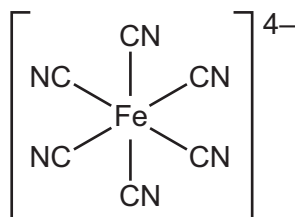
.....

2

..... [2]

[Total: 4]

31 The structure of an ion is shown.

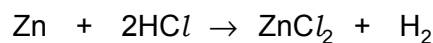


Deduce the molecular formula of this ion to show the number of iron, carbon and nitrogen atoms.

..... [1]

[Total: 1]

32 A student investigated the reaction between zinc and dilute hydrochloric acid by measuring the volume of hydrogen gas produced at one minute intervals.

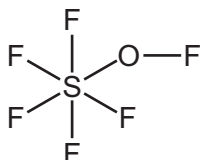


Give the name of the salt formed in this reaction.

..... [1]

[Total: 1]

33 The structure of a sulfur compound is shown.



Deduce the molecular formula of this compound showing the number of sulfur, fluorine and oxygen atoms.

..... [1]

[Total: 1]

34 Phosphorus burns in oxygen to form phosphorus(V) oxide.

Balance the chemical equation for this reaction.



[Total: 1]

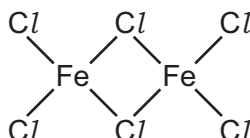
- 35 Selenium reacts with fluorine to form selenium(VI) fluoride.

Balance the chemical equation for this reaction.



[Total: 1]

- 36 A chloride of iron has the structure shown.

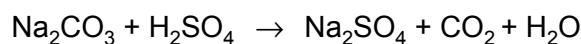


Deduce the molecular formula of this compound showing the number of iron and chlorine atoms.

..... [1]

[Total: 1]

- 37 The chemical equation for the reaction between sodium carbonate and dilute sulfuric acid is shown.



Write the word equation for this reaction.

..... [2]

[Total: 2]

- 38 The formulae of some chlorides are given.

aluminium chloride, AlCl_3

calcium chloride, CaCl_2

sodium chloride, NaCl

Deduce the formula for magnesium chloride.

..... [1]

[Total: 1]

39 The formulae of some bromides are given.

aluminium bromide, $AlBr_3$

magnesium bromide, $MgBr_2$

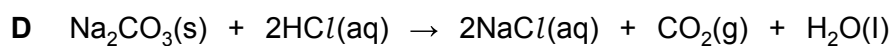
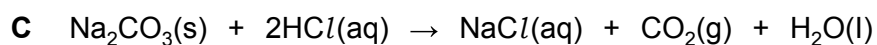
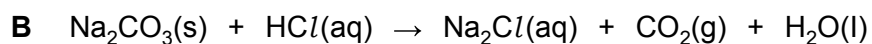
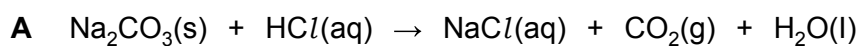
sodium bromide, $NaBr$

Deduce the formula for calcium bromide.

..... [1]

[Total: 1]

40 Which equation for the reaction between sodium carbonate and dilute hydrochloric acid is correct?



[1]

[Total: 1]