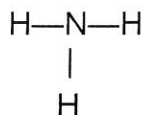


Name: _____

Class: _____

Rocks and building

1 The diagram shows a molecule of ammonia, NH₃.



Match the words **A**, **B**, **C** and **D** with spaces **1** to **4** in the sentences.

- A** bonds
- B** electrons
- C** elements
- D** symbols

Ammonia is a compound made from two**1**..... .

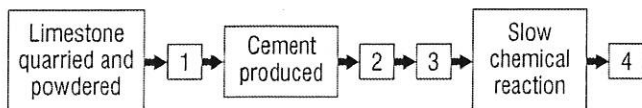
The atoms in the molecule are represented by**2**..... .

The atoms in ammonia are held together by chemical**3**..... .

Each atom has a nucleus surrounded by**4**..... .

(4)

2 The diagram shows stages in making cement and concrete.



Match statements **A**, **B**, **C** and **D** with the numbers **1** to **4** to describe what happens in this process.

- A** cement mixed with sand and crushed rock
- B** concrete produced
- C** limestone heated in a kiln with clay
- D** water added to mixture

(4)

Continued ...

- 3 (a) Slaked lime is made by reacting quicklime with:
- A carbon dioxide
 - B oxygen
 - C sulfuric acid
 - D water (1)
- (b) The chemical name for slaked lime is:
- A calcium chloride
 - B calcium hydroxide
 - C calcium oxide
 - D calcium sulfate (1)
- (c) Slaked lime can be used to make:
- A bricks
 - B clay
 - C mortar
 - D quicklime (1)
- (d) Lime water goes cloudy when reacted with carbon dioxide. Which substance is produced?
- A calcium carbonate
 - B calcium chloride
 - C calcium oxide
 - D calcium sulphate (1)

4 Glass is used in almost all buildings.

(a) Suggest **two** properties of glass that make it useful in buildings.

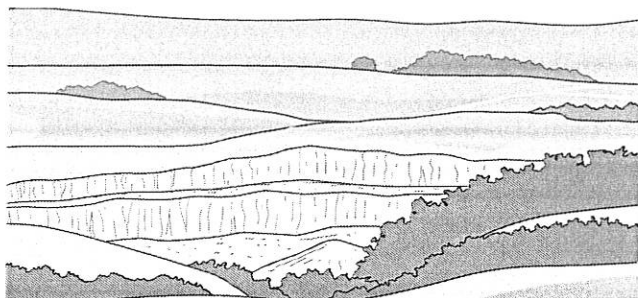
.....
 (2)

(b) Suggest and explain one disadvantage of using glass in buildings.

.....
 (2)

Continued ...

- 5 One of the largest limestone quarries in the United Kingdom is near the town of Buxton. It is in the Peak District National Park, an area popular with tourists.



Suggest **three** social or environmental issues involved in quarrying limestone in the Peak District.

.....

 (3)

- 6 Mortars used in most modern buildings are made using cement.

A student tested the strength of a ready-mixed mortar. He did this by dropping a mass onto a small mortar beam from increasing heights until the beam broke in half. He tested 4 beams made from the mortar. His results were 20 cm, 50 cm, 65 cm and 15 cm.

- (a) What was the range of the student's results?

.....
 (2)

- (b) Work out the mean of his results.

..... (1)

- (c) Comment on the precision of his results.

..... (1)

- (d) (i) Besides cement, what was the other solid in the ready-mixed mortar?

..... (1)

- (ii) What other solid is needed to make concrete instead of mortar?

..... (1)

Name: _____

Class: _____

Rocks and metals

1 This question is about the uses of these metals:

- | | |
|--------------------|-----------------|
| A aluminium | B copper |
| C gold | D iron |

Which of these metals is used:

- (a) as the main metal in alloys to build aircraft?
- (b) in alloys to make jewellery?
- (c) to make all steels?
- (d) to make water pipes and electrical wiring?

(4)

2 Choose a metal from the list **A** to **D** to match each description.

- | | |
|--------------------|-------------------|
| A aluminium | B chromium |
| C gold | D titanium |

(a) A metal that is strong at high temperatures and resists corrosion.

.....

(b) An unreactive metal found native in the Earth.

.....

(c) This metal has a low density and is extracted by electrolysis.

.....

(d) This metal is mixed with iron to make high alloy steels.

.....

(4)

3 Use words from the list **A** to **D** to complete the word equations.

- | | |
|-----------------|----------------|
| A copper | B iron |
| C sodium | D water |

(a) copper oxide + sulfuric acid → copper sulfate +

(b) copper sulfate + iron → + iron sulfate

(c) iron oxide + carbon → + carbon dioxide

(d) titanium chloride + → titanium + sodium chloride

(4)

Continued ...

- 4 A student tested the flexibility of four different alloy rods. She suspended a mass from the end of the rods which were fixed at the other end to the edge of a bench. She measured how far each rod bent.

Which words describe the 'distance the rod bent'?

- A a categoric, independent variable.
- B a continuous, independent variable.
- C a categoric, dependent variable.
- D a continuous, dependent variable. (1)

- 5 Name the types of substance described in each part of this question.

(a) These elements are hard, tough and strong, conduct heat and electricity well and are found in the middle of the periodic table.

.....

(b) These rocks contain enough metal to make it worth extracting.

.....

(c) This is a metal that contains other elements to give it specific properties.

.....

(d) These materials are smart because they can return to their original shape when heated and are used by surgeons to hold broken bones while healing.

..... (4)

- 6 Iron is extracted from iron oxide by removing oxygen.

(a) What name is given to a reaction in which oxygen is removed from a compound?

..... (1)

(b) Name an element that could be used to remove oxygen from iron oxide.

..... (1)

(c) Write a word equation for the reaction that would take place in (b).

.....

..... (2)

Continued ...

7 Titanium is used to make replacement hip joints. One reason why titanium can be used in this way is that it resists corrosion.

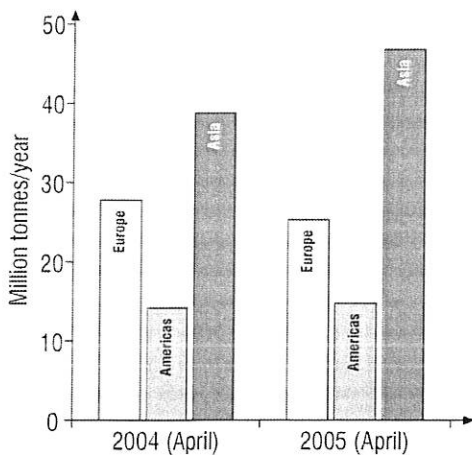
(a) How is titanium protected from corrosion?

..... (1)

(b) Suggest **two** other properties of titanium that make it suitable for this use.

.....
..... (2)

8 Most of the world's steel is now made in Asia.



Suggest **two** reasons why it costs less to make steel in Asia than in Europe.

.....
..... (2)

9 New methods using bacteria, fungi and plants are being developed to extract copper. Suggest **three** reasons why these new methods have been developed.

.....
.....
..... (3)

Name: _____

Class: _____

Crude oil

1 The following compounds are found in crude oil:

- A C_3H_8
- B C_8H_{18}
- C $C_{12}H_{26}$
- D $C_{16}H_{34}$

Which of these compounds:

- (a) has the highest boiling point?
- (b) catches fire most easily?
- (c) is collected at the top of the fractionating column when crude oil is distilled?
- (d) is the thickest liquid? (4)

2 Crude oil is a mixture of many different hydrocarbons.

Match the words **A**, **B**, **C** and **D** with spaces **1** to **4** in the sentences.

- A alkanes
- B compounds
- C fractions
- D molecules

- (a) Crude oil is separated by distillation into**1**..... containing hydrocarbons with similar boiling points.
- (b) Hydrocarbons with the smallest**2**..... have the lowest boiling points.
- (c) Hydrocarbons are**3**..... of hydrogen and carbon only.
- (d) Crude oil contains mostly saturated hydrocarbons called**4**..... . (4)

Continued ...

- 3 The table shows the number of carbon atoms in the molecules of four fuels obtained from crude oil.

Fuel	Number of carbon atoms in molecules
petroleum gases	2–4
petrol	4–10
kerosene	10–15
diesel oil	14–19

- (a) The fuel with the highest boiling point is ...

- A petroleum gases
- B petrol
- C kerosene
- D diesel oil

(1)

- (b) Petrol ...

- A has a higher boiling point than diesel oil.
- B is a thinner liquid than diesel oil.
- C ignites less easily than kerosene.
- D has larger molecules than kerosene.

(1)

- (c) The molecule C_4H_{10} could be in ...

- A petrol only.
- B petrol and kerosene.
- C petrol and petroleum gases.
- D petroleum gases only.

(1)

- (d) Which one of the following is a saturated hydrocarbon that could be in diesel oil?

- A $C_{12}H_{26}$
- B $C_{16}H_{32}$
- C $C_{17}H_{36}$
- D $C_{18}H_{38}O$

(1)

Continued ...

- 4 Pentane, C_5H_{12} , is a hydrocarbon fuel. It burns completely in plenty of air.
- (a) Name the gas in the air that pentane reacts with when it burns.
 (1)
- (b) Write a word equation for the combustion of pentane in plenty of air.

 (2)
- (c) Write a balanced symbol equation for this reaction.

 (2)
- (d) When the air supply is limited a poisonous gas is produced. Name this gas.
 (1)
- (e) Write a balanced symbol equation for the combustion of pentane in a limited supply of air.

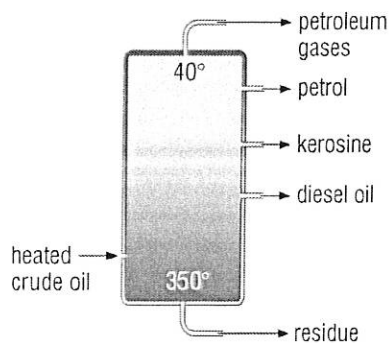
 (2)
- 5 (a) Suggest two fuels that could be used in place of fossil fuels. Give one advantage and one disadvantage for each of the fuels you have named.

 (6)
- 6 Oil companies promote the use of low sulfur fuels.
- (a) Explain why it is better to use low sulfur fuels.

 (3)
- (b) Suggest one other reason why oil companies advertise that their fuels are low in sulfur.
 (1)

Continued ...

- 7 Crude oil is separated by fractional distillation. In oil refineries this is done in tall towers called fractionating columns.



Give the main steps in this process and explain how the different fractions are separated in a fractionating column.

.....

.....

.....

.....

(4)

Name: _____

Class: _____

Products from oil

1 This question is about polymers.

Match the words **A**, **B**, **C** and **D** with the spaces **1** to **4** in the sentences.

A transparent

B light sensitive

C thermosetting

D thermosoftening

A plastic that can be remoulded is made from a**1**..... polymer.

The plastic used to make a handle for a grill pan would be best made from a polymer that is**2**.....

The polymers used to make food wrappings for use in a supermarket are best if they are**3**.....

Some new types of sticking plaster can be removed easily because they are made from**4**.....polymers.

(4)

2 Match the words **A**, **B**, **C** and **D** with the descriptions **1** to **4** in the table.

A bromine

B butene

C poly(ethene)

D propane

	Description
1	An alkane
2	A polymer
3	Used to make polymers
4	Used to test for unsaturation

(4)

Continued ...

5 Read the passage about 'Slime' and use the information to help you answer the questions.

'Slime' has some of the properties of a liquid and some of the properties of a solid. It can be poured but it bounces if dropped on the floor. 'Slime' is made by mixing a solution containing a polymer called PVA with borax. When the substances are mixed the borax forms cross-links between the polymer chains. Some of the cross-links are chemical bonds and some are intermolecular forces involving water molecules. Lots of water molecules are held between the polymer chains and these give 'Slime' its flexibility and fluidity.

(a) Describe a molecule of a typical polymer.

.....
..... (2)

(b) Suggest why 'Slime' has the properties of both a solid and a liquid.

.....
.....
..... (3)

(c) Suggest one method that you could use to modify the properties of 'Slime'.

..... (1)

(d) A student tested different types of 'Slime' by measuring how far they stretched before they broke.

(i) What was the independent variable in the investigation?

..... (1)

(ii) What type of variable was the dependent variable – categoric, ordered, discrete or continuous?

..... (1)

Name: _____

Class: _____

Plant oils

1 The energy values of chips depend on their fat content.

Match the energy values **A**, **B**, **C** and **D** with the numbers **1** to **4** in the table.

A 687 kJ/100 g

B 796 kJ/100 g

C 1001 kJ/100 g

D 1174 kJ/100 g

	Description of type of chips	Fat content (g/100 g)
1	Fish and chip shop, fried in blended oil	12.4
2	French fries from burger outlet	15.5
3	Homemade fried in blended oil	6.7
4	Oven chips, frozen, baked	4.2

(4)

2 Match the words **A**, **B**, **C** and **D** with spaces **1** to **4** in the sentences.

A cooking oils

B emulsifiers

C emulsions

D hydrogenated oils

Mayonnaise and salad dressings are**1**..... that are made by mixing oil and vinegar with other ingredients such as egg yolk.

In mayonnaise the egg yolk contains**2**.....that stop the oil and water separating.

Vegetable oils can be converted into**3**..... by reacting with hydrogen and a catalyst.

Biodiesel is a fuel that can be made from waste**4**..... .

(4)

Continued ...

3 The table on the next page gives some information about four different vegetable oils.

Smoke point is the temperature at which the oil begins to smoke when heated.

Match descriptions **A**, **B**, **C** and **D** with numbers **1** to **4** in the table.

- A** The oil that contains the most monounsaturated fat.
- B** The oil that reacts with the largest volume of bromine water.
- C** The oil with the highest melting point.
- D** The oil with the widest range of smoke point.

	Type of oil			
	1	2	3	4
	Corn oil	Olive oil	Sunflower oil	Rapeseed oil
Saturated fat (%)	14.4	14.3	12.0	6.6
Mono-unsaturated fat (%)	29.9	73.0	20.5	59.3
Poly-unsaturated fat (%)	51.3	08.2	63.3	29.3
Melting point (°C)	-15	-12	-18	5
Smoke point (°C)	229–268	204–210	229–252	230–240

(4)

Continued ...

4 Use the table of types of chips in question 1 to help you answer these questions.

(a) Why do chips contain fat?

..... (1)

(b) Why do French fries contain most fat?

..... (1)

(c) Why do oven chips contain least fat?

.....
..... (2)

(d) Why do all chips have a golden brown colour, but boiled potatoes remain white?

.....
..... (2)

(e) (i) How would you display the data in the table?

..... (1)

(ii) Explain your answer to part (i).(1)

..... (1)

5 Virgin olive oil is extracted by mechanical methods that do not modify its properties. If the temperature during extraction does not exceed 27°C the oil can be labelled as 'cold pressed'. Any olive oil that remains in the pressed pulp can be extracted by dissolving it in a solvent. The solvent is removed from the oil by evaporation. This type of oil is called pomace oil.

(a) Why is it important that the temperature does not exceed 27°C during extraction?

.....
..... (2)

(b) Suggest why some people prefer virgin olive oil to pomace oil.

.....
..... (2)

Continued ...

- 6 Some students made a solution of the colours in a soft drink. Describe how you could use paper chromatography to show how many colours were in the solution.

.....

.....

.....

.....

(4)

Name: _____

Class: _____

The changing world

1 Match words **A**, **B**, **C** and **D** with the numbers **1** to **4** in the table.

A atmosphere

B core

C crust

D mantle

	Description
1	Almost entirely solid, but can flow very slowly
2	Contains mainly the elements nitrogen and oxygen
3	Has an average thickness of about 6 km under oceans and 35 km under continents
4	Part liquid and part solid, with a radius of about 3 500 km

(4)

2 Match words **A**, **B**, **C** and **D** with the spaces **1** to **4** in the sentences.

A believed

B dismissed

C produced

D published

In 1912 Alfred Wegener**1**..... a theory that a single land mass had split apart into continents that moved to their current positions.

At the time geologists**2**..... that the continents moved up and down – not sideways.

Wegener's theory was**3**..... by geologists because he could not explain how the continents moved.

In 1944 an English geologist explained that heat from radioactivity**4**..... convection currents strong enough to move continents.

(4)

Continued ...

3 Match words **A**, **B**, **C** and **D** with spaces **1** to **4** in the sentences.

- A ammonia
- B carbon dioxide
- C noble gases
- D oxygen

The Earth's early atmosphere consisted mainly of**1**..... with some nitrogen, water vapour, methane and**2**.....

The Earth's atmosphere now contains 78% nitrogen, 21%**3**....., about 1%**4**..... and 0.04% carbon dioxide. (4)

4 This question is about three of the noble gases, helium, neon and argon.

(a) Why is helium used in balloons and airships rather than hydrogen?

.....
..... (2)

(b) Explain how argon allows you to use an electric light bulb for many hours.

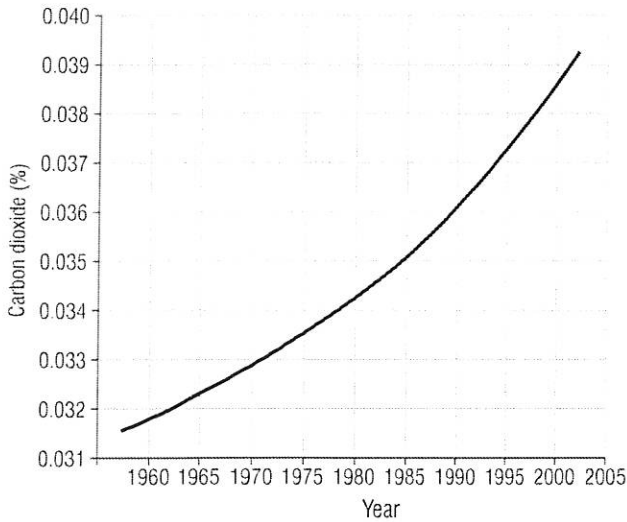
.....
..... (2)

(c) Explain how neon is used for advertising.

.....
..... (2)

Continued ...

5 The graph shows the percentage of carbon dioxide in the atmosphere in recent years.



- (a) (i) Could the 'percentage' of carbon dioxide in the atmosphere be described as a categorical, discrete or continuous variable?
..... (1)
- (ii) There is considerable variation in the percentage of carbon dioxide within each 5 year period. What do we call the line that 'smooths out' these variations on the graph?
..... (1)
- (b) By how much has the percentage of carbon dioxide increased from 1960 to 2005?
..... (1)
- (c) What is this increase as a percentage of the 1960 figure?
..... (1)
- (d) Suggest **two** reasons for this increase.
.....
..... (2)
- (e) What natural processes remove carbon dioxide from the atmosphere?
.....
.....
..... (3)
- (f) Why should we be concerned about the increase in carbon dioxide?
.....
..... (2)