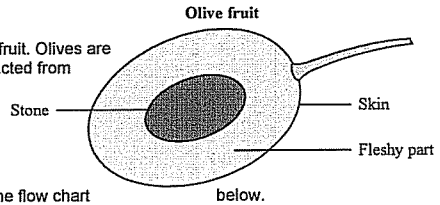
Vegetable oils and emulsions

1. This question is about extracting oil from a fruit. Olives are fruits of the olive tree. Olive oil can be extracted from olives.



The stages in the extraction are shown in the flow chart below.

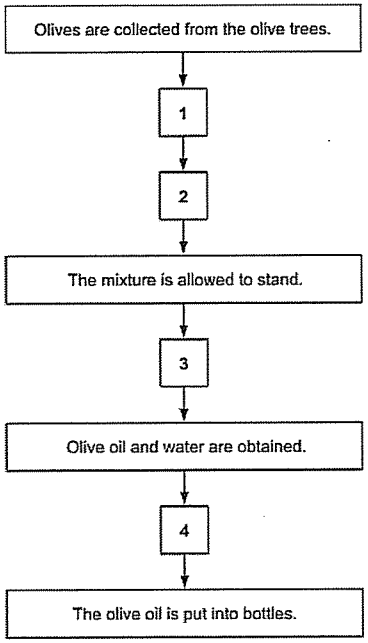
Match sentences, **A**, **B**, **C** and **D**, with the numbers **1– 4** in the flow chart.

A Olive oil separates from the water.

B The mixture is pressed.

C Water is added and the mixture is stirred.

D The olives are crushed.



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2. Plant oils have many uses.

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

A a fuel

B an emulsion

C energy

D temperature

Vegetable oil can be burned as . . . **1** . . . .

Vegetable oils are useful foods because they contain a lot of . . . **2** . . . .

Vegetable oils cook food at a higher . . . **3** . . . than water.

In some foods, vegetable oil is mixed with another liquid to form . . . **4** . . . .

3. Ice-cream is a foam because it has small air bubbles trapped inside it.

Ice-cream is sold by volume. Ice-cream manufacturers increase the volume of air in a product so that they make more money.

A student investigated the volume of air in four different ice-creams, **K**, **L**, **M** and **N**. The four ice-creams were kept in the same freezer.

For each ice-cream, the following procedure was carried out:

- the student measured the volume of some ice-cream straight from the freezer
- the ice-cream was then melted down, allowing the air to escape
- the volume of the ice-cream was re-measured to give the final volume.

The results are shown in the table.

Ice-cream	K	L	M	N
Initial volume in cm^3	100	100	100	100
Final volume in cm^3	96	91	87	95

(a) Which ice-cream originally contained the most air?

1 K

2 L

3 M

4 N

(b) The investigation was fair because . . .

1 the same volume of ice-cream was used each time.

2 four samples of ice-cream were used.

3 the investigation was repeated.

4 the temperature of the ice-creams was kept constant during the investigation.

(c) The student could have improved the reliability of the investigation by . . .

1 allowing the ice-cream to melt over a longer period of time.

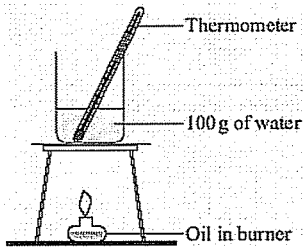
2 checking that the temperature was constant throughout the investigation.

3 using more than four ice-cream samples.

4 repeating the investigation.

4. A student was comparing two vegetable oils, **X** and **Y**, to find out how much heat they release when they burn.

She used the apparatus shown in the diagram. The oil was allowed to burn for 6 minutes in each test.



Her results are shown in the table.

	Oil X	Oil Y
Mass of empty oil burner	60 g	60 g
Mass of oil burner + vegetable oil	67 g	66 g
Mass of oil burner + vegetable oil after burning	62 g	63 g
Initial temperature of water in the beaker	24 °C	24 °C
Final temperature of water in the beaker after heating	49 °C	42 °C

(a) How many grams of oil **X** were burned during the experiment?

1 2 g

2 4 g

3 5 g

4 7 g

(b) Oil **X** produced a temperature rise of 5 °C per gram of oil burned.

What rise in temperature was produced by burning 1 g of oil Y?

1 3 °C

2 6 °C

3 18 °C

4 42 °C

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(c) How could the student improve the reliability of the results for each oil?

1 Repeat the experiment several times and take the mean (average) value.

2 Burn the same mass of oil **X** and oil **Y** in the tests.

3 Burn the same mass of oil **X** and oil **Y** but for a shorter length of time.

4 Use several other oils and compare the results with those for oil **X** and oil **Y**.

(d) The student could get more accurate results if she improved the design of her apparatus.

One improvement would be to . . .

1 use a larger beaker.

2 use a thermometer with a larger range of temperatures.

3 burn a smaller quantity of oil each time.

4 protect the flame from draughts.

The Earth's atmosphere

1. This question is about gases in the Earth's atmosphere.

In the Earth's early atmosphere	In the Earth's atmosphere today
Carbon dioxide Small amounts of: ammonia, NH_3 methane, CH_4 Water vapour	Nitrogen Oxygen Small amounts of: carbon dioxide noble gases Water vapour

Match gases, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table below.

A ammonia

B helium

C methane

D oxygen

	What we can say about the gas
1	It is a hydrocarbon.
2	It is a noble gas.
3	It is a compound of nitrogen and hydrogen.
4	It is produced in the atmosphere by the activity of plants.

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2. In each part choose only **one** answer.

Carbon is an essential part of all living things and it is often circulated in nature in carbon dioxide.

A Carbon dioxide is removed from the atmosphere when it dissolves in sea water to form soluble . . .

1 calcium carbonate.

2 calcium hydrogencarbonate.

3 carbohydrates.

4 hydrocarbons.

B The amount of carbon dioxide in the atmosphere is also reduced by . . .

1 the activity of plants.

2 the destruction of forests.

3 the eruptions of volcanoes.

4 the weathering of limestone.

C Carbon dioxide is released into the atmosphere from volcanoes following the decomposition of . .

1 carbonate rocks.

2 igneous rocks.

3 metamorphic rocks.

4 sandstone rocks.

D Recently, the balance between the amount of carbon dioxide released into the atmosphere and the amount used up has been disturbed.

This is mainly because of . . .

1 burning of increased amounts of fossil fuels.

2 increased volcanic activity.

3 planting of large areas of forests.

4 the operation of more nuclear power stations.

3. (a) There was little or no nitrogen in Earth's early atmosphere, but a gaseous compound of nitrogen was present in small amounts.

This gaseous compound is . . .

1 ammonia.
2 carbon dioxide.
3 methane.
4 sulfur dioxide.

In 1892, Lord Rayleigh compared nitrogen from the air with very pure nitrogen obtained from nitrogen compounds. The density of the nitrogen was:

nitrogen from the air = 1.2572 grams per litre
nitrogen from nitrogen compounds = 1.2511 grams per litre.

Rayleigh and Sir William Ramsay proved that atmospheric nitrogen was not pure but contained five other gases, which together made up about 1% of the Earth's atmosphere. The gases were argon (0.94%) and traces of helium, neon, krypton and xenon.

The five gases are similar in that they show no chemical reactions but have different physical properties, eg density, melting point, boiling point.

(b) The main reason why scientists did **not** find these five gases in the atmosphere at an earlier date was that . . .

1 they have a very low density.
2 they are present in only small quantities.
3 they are unreactive.
4 they are colourless.

(c) One way of separating the five gases from each other is by . . .

1 passing a mixture of the gases over heated carbon.
2 allowing them to settle, according to density, in a glass vessel.
3 fractional distillation of the mixture.
4 passing a mixture of the gases over a nickel catalyst.

(d) From the information given in the question, it is safe to predict that . . .

1 nitrogen makes up about 78% of the atmosphere.
2 argon has a density greater than the density of nitrogen.
3 neon, krypton and xenon have a density lower than the density of nitrogen.
4 nitrogen from nitrogen compounds must contain a very light gas such as hydrogen.

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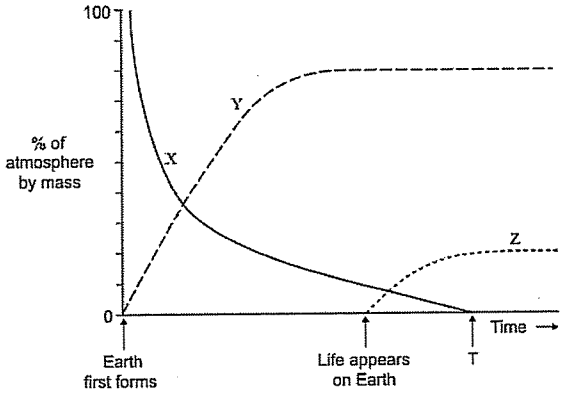
4. The diagram below shows how the levels of nitrogen, oxygen and carbon dioxide in the Earth's atmosphere have changed with time.



(a) What is the ratio, by mass, of gas **Z** to gas **Y** at time **T**?

1 1:4
2 1:5
3 4:1
4 5:1

(b) Which one of the following correctly matches the lines on the graph?

1 **X** is carbon dioxide, **Y** is nitrogen and **Z** is oxygen
2 **X** is oxygen, **Y** is nitrogen and **Z** is carbon dioxide
3 **X** is nitrogen, **Y** is oxygen and **Z** is carbon dioxide
4 **X** is carbon dioxide, **Y** is oxygen and **Z** is nitrogen

(c) During the last 200 million years, . . .

1 the burning of fossil fuels has decreased the proportion of oxygen in the Earth's atmosphere.
2 intense volcanic activity has substantially changed the atmosphere of the Earth.
3 the percentage of carbon dioxide in the Earth's atmosphere has decreased considerably.
4 the proportion of nitrogen in the Earth's atmosphere has remained fairly constant.

(d) It is thought that there is no oxygen in the atmosphere of the planet Venus. This is because . . .

1 animals used it up in respiration.
2 it is locked up in sedimentary rocks.
3 it is locked up in fossil fuels.
4 there are no plants to produce it by photosynthesis.