

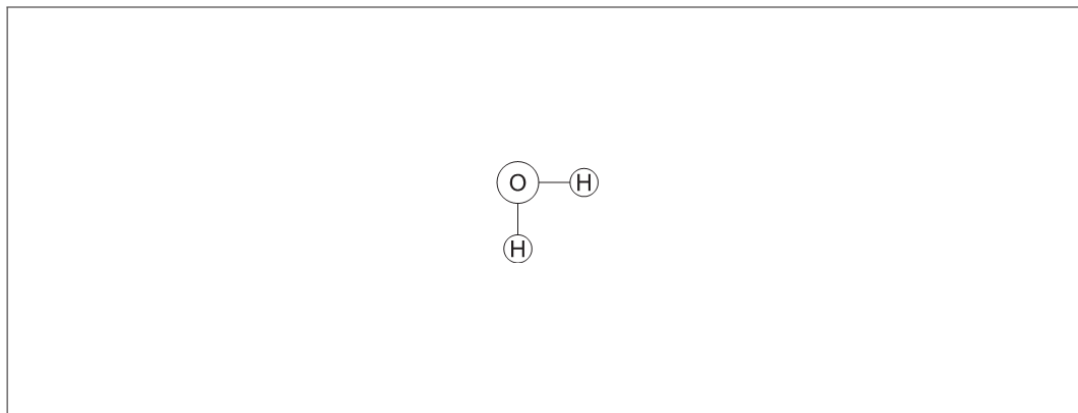


Answer key

biological molecules [13 marks]

1a. [2 marks]

The figure represents a water molecule.



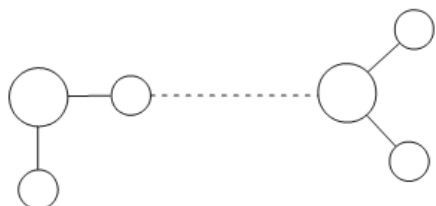
Draw a second water molecule to show how bonds can form between water molecules, including the name of the bond.

Markscheme

- similar water molecule drawn with oxygen on one molecule facing hydrogen on the other water molecule
- one hydrogen bond drawn as a dotted/dashed line between the two water molecules and labelled

O and H do not have to be labelled but must be positioned correctly

eg :



Can get this mark even if atoms incorrect

1b. [3 marks]





Answer key

Water has important solvent properties. Explain these properties using an example to illustrate your answer.

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.....
.....
.....
.....
.....

Markscheme

a. water molecule is polar

OR

water has «weak» positive and negative charges

c. water forms hydrogen bonds with **polar** substances

d. positive/hydrogen side/pole of water attracted to negative **ions**

OR

negative/oxygen side/pole attracted to positive **ions**

e. glucose/other example dissolves because it is polar

OR

sodium chloride/other example dissolves because ions are attracted to water

[Max 3 Marks]

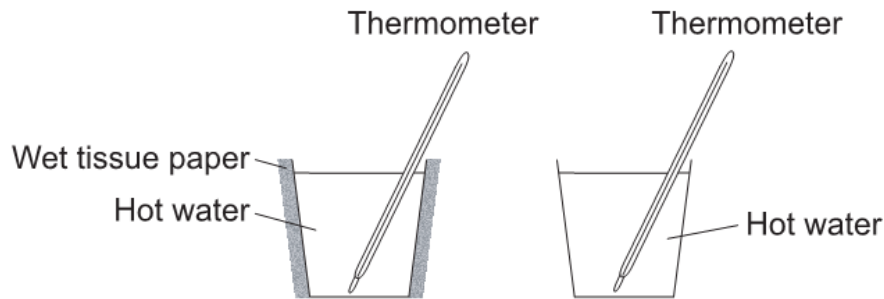
2a. [1 mark]

To investigate the thermal properties of water, students placed hot water in two thin plastic cups and measured their rate of cooling. The sides of one cup were covered with tissue paper soaked in hot water; the other cup was left uncovered. The temperature was recorded with a thermometer every 4 minutes for 20 minutes. The temperature in the laboratory was 18 °C.

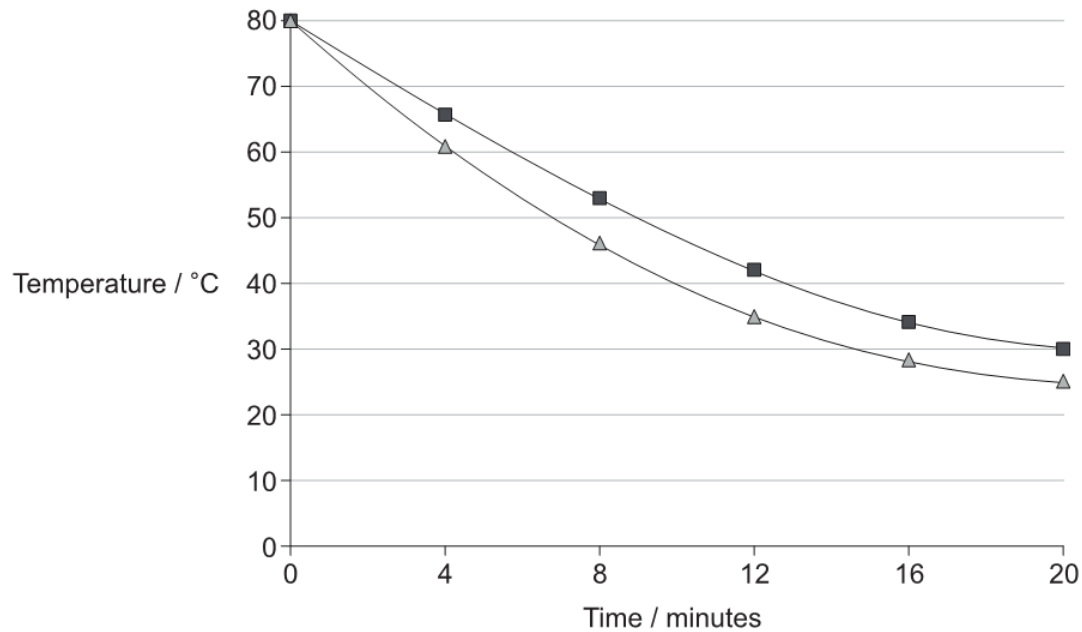




Answer key



[Source: © International Baccalaureate Organization 2017]



Key: ■ uncovered ▲ covered with wet tissue paper

[Source: © International Baccalaureate Organization 2017]

Calculate the change in temperature in each cup after 20 minutes.

Uncovered:

Covered with wet tissue paper:

Markscheme

uncovered: 50 °C

covered with wet tissue paper: 55 °C



Answer key

Both needed

Accept range 49 to 51 °C and 54 to 56 °C

Units required

Accept negative numbers (-50 °C and -55 °C)

Working on its own without an answer is insufficient for the mark (eg: 80 – 30)

2b. [2 marks]

State **two** conditions that must be the same for each cup at the start of the experiment.

Markscheme

a. volume/mass/amount of water they contain

b. temperature of water

c. placed in similar environment/on similar surface

OWTTE

d. «container must be» the same shape/size/volume/surface area

Do not award “ambient room temperature” or “material of cups”

Do not accept “type of water”

[Max 2 Marks]

2c. [1 mark]

Predict the temperature of the water in the cups after 3 hours.

.....
.....
.....





Answer key

Markscheme

18 °C

OR

room temperature

If the answer is given as a numerical value then units are required

2d. [3 marks]

Explain, with reference to the thermal properties of water, how this experiment helps demonstrate how humans respond to overheating.

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.....

Markscheme

- a. water has a high latent heat/high heat of vaporization
- b. energy required to evaporate water «from the tissue paper»
- c. evaporation of water leads to cooling
- d. sweat produced by skin in response to heat
- e. «evaporation of» sweat cools the body

Do not accept specific heat

[Max 3 Marks]

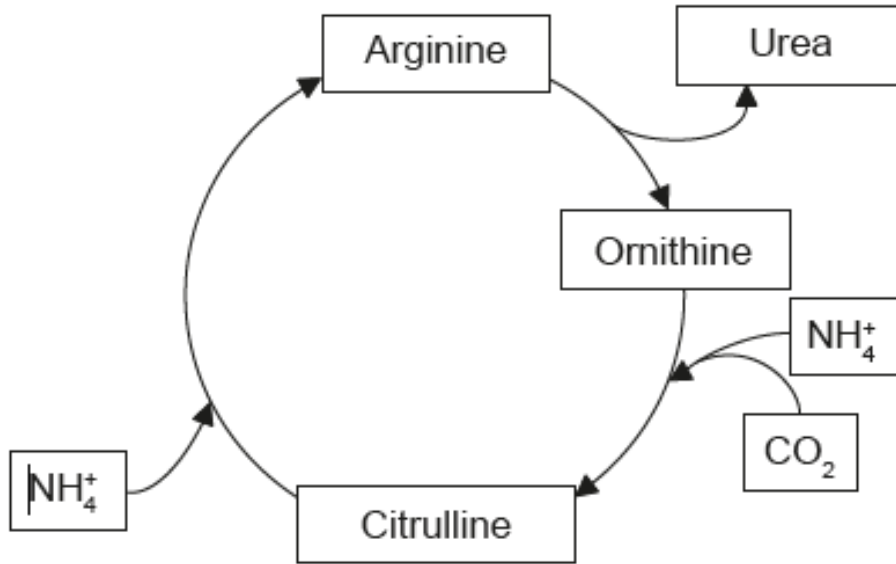




Answer key

3. [1 mark]

The diagram shows a cycle of reactions that occurs in human liver cells.



Which term describes the overall reactions of this cycle?

- A. Oxidation
- B. Catabolism
- C. Condensation
- D. Metabolism

Markscheme

D
