

Q1.

- (a) Describe how an ATP molecule is formed from its component molecules.

(4)**Q2.**

- (b) Water is used to hydrolyse ATP.

Name the **two** products of ATP hydrolysis.

1. _____

2. _____

(1)

Hydrolysis of ATP is catalysed by the enzyme ATP hydrolase.

A student investigated the effect of ATP concentration on the activity of ATP hydrolase. She used shortening of strips of muscle tissue caused by contraction as evidence that ATP was being hydrolysed.

- She took four slides **A, B, C** and **D**, and added strips of muscle tissue of the same length to each slide.
- She then added the same volume of ATP solutions of different concentrations to the four slides and left each slide for five minutes.
- She then recorded the final length of each strip of muscle tissue.

Her results can be seen in the table.

Slide	Concentration of ATP solution added to slide / $\times 10^{-6} \text{ mol dm}^{-3}$	Final length of muscle tissue after 5 minutes / mm
A	2	36
B	4	31
C	6	29
D	8	26

(c) Other than those given, name two variables the student should have controlled.

1. _____

2. _____

(2)

(d) Describe and explain the pattern shown by the data in the table.

Description _____

Explanation _____

(2)

- (e) The hydrolysis of 1 dm³ of a 1 mol dm⁻³ solution of ATP releases 30 500 J of energy.

60% of the energy released during the hydrolysis of 1 mol dm⁻³ of ATP is released as heat; the rest is used for muscle contraction.

The student added 0.05 cm³ of ATP solution to slide **D**.

Calculate the energy available from ATP for contraction of the muscle on this slide.

Answer = _____ J

(3)

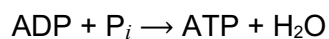
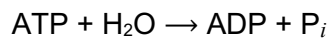
(Total 10 marks)

Q3.

Scientists investigated treatment of a human bladder infection caused by a species of bacterium. This species of bacterium is often resistant to the antibiotics currently used for treatment.

They investigated the use of a new antibiotic to treat the bladder infection. The new antibiotic inhibits the bacterial ATP synthase enzyme.

- (a) Place a tick (✓) in the appropriate box next to the equation which represents the reaction catalysed by ATP synthase.



(1)

- (b) The new antibiotic is safe to use in humans because it does **not** inhibit the ATP synthase found in human cells.

Suggest why human ATP synthase is not inhibited and bacterial synthase is inhibited.

(1)

Q4.

- (b) ATP is an energy source used in many cell processes. Give **two** ways in which ATP is a suitable energy source for cells to use.

1. _____

2. _____

(2)

Q5.

Cells constantly hydrolyse ATP to provide energy.

- (a) Describe how ATP is resynthesised in cells.

(2)

(b) Give **two** ways in which the hydrolysis of ATP is used in cells.

1. _____

2. _____

(2)