Mark schemes

Q1.

(a) Accept any **two** of the following for **1** mark;

Volume/mass soda lime

Concentration of soda lime

Number/mass of woodlice

Age of woodlice

Same woodlice

Species/type of woodlice

Time for woodlice to acclimatise to (water bath) temperature

(Starting) concentration of oxygen (inside the apparatus)

Light intensity

Accept weight/volume of woodlice for number/mass of woodlice

Ignore 'amount' for concentration/volume/weight/mass

1

(b) 1. Open the (3-way) tap;

Accept descriptions of opening the tap, eg push/move/turn

2. Push/press the syringe (down);

Accept descriptions of the pushing the syringe down, eg apply pressure to the syringe

2

(c) 1. No woodlice **and** all other conditions/apparatus/equipment the same;

Accept other inert objects instead of woodlice eg glass beads

Accept dead woodlice for no woodlice

Accept descriptions of 'all other conditions/apparatus/equipment the same' eg same investigation

2. To show that (respiring) woodlice are causing the drop to move

OR

To show that (respiring) woodlice are taking up the oxygen
OR

To show that (respiring) woodlice are causing the change in volume/pressure;

Accept to show that (respiring) woodlice are affecting the results

*Accept 'no other factor(s)' **OR** no other named factor **OR** 'nothing else' for woodlice*

2

(d) Correct answer of 0.11 = **3 marks**;;;

0.10816247795/0.1082600897/0.1082173395 = **2 marks** (answer not to 2 dp)

Evidence of $\frac{3.14 \times 1.25^2 \times 25}{(5 \times 60) \times 3.78}$ and incorrect answer to 2 dp = **2 marks** (for input error into calculator)

0.41 = **2 marks** (mean rate in $mm^3\ s^{-1}$ for 3.78 g of woodlice)

32.45/32.48/32.47 = **2 marks** (mean rate in $mm^3\ g^{-1}$ in 5 minutes)

0.43 = **2 marks** (used diameter instead of radius in calculation)

Evidence of $\frac{3.14 \times 1.25^2 \times 25}{(5 \times 60) \times 3.78}$ and incorrect answer to **not** to 2 dp = **1 mark** (for input error into calculator)

122.65625/122.767857142/122.718463 = **1 mark** (volume of oxygen taken up in 5 minutes)

0.40885416/0.40922619047/0.4090615434 = **1 mark** (mean rate in $mm^3\ s^{-1}$ for 3.78 g of woodlice and not to 2 dp)

32.44874339/32.47826909/32.46520186 = **1 mark** (mean rate in $mm^3\ g^{-1}$ in 5 minutes and not to 2 dp)

0.4326499118/0.43286935813/0.43304358780 = **1 mark** (used diameter instead of radius in calculation and not to 2 dp)

0.08 = **1 mark** (distance travelled by the drop per second)

0.02 = **1 mark** (just used 25 mm distance travelled by the drop and not worked out volume)

*For **3 marks** accept 1.08×10^{-1}*

3

[8]

Q2.

(a) Accept any **two** of the following for **one** mark:

Concentration/mass of yeast
Concentration/mass of glucose/sugar (solution/s)
Concentration of oxygen (in solution)
Volume of yeast
Volume of glucose/sugar (solution/s) pH (of glucose/sugar solution/s)
Species/type of yeast
Size/diameter/volume of test tubes

Ignore number of yeast cells

Ignore amount for volume or concentration

1

(b) Correct answer of 2.5×10^{-2} **= 2 marks**;;

4.2×10^{-2} (scale read from the wrong direction) **= 1 mark**

OR

2.5×10^{-3} (scale read as 3.7 mm not 3.7 cm) **= 1 mark**

OR

2.4×10^{-2} (scale read as 36.5) **= 1 mark**

OR

Correct answer not in standard form and/or not to 2 significant figures, eg $0.0247/0.025/2.47 \times 10^{-2}$ **= 1 mark**

OR

Answer in incorrect standard form eg 25×10^{-3} **or** 0.25×10^{-1} **= 1 mark**

OR

Evidence of $37 \div 1500$ **or** $37 \div (25 \times 60)$ **= 1 mark**

2

(c) 1. Maltose is a disaccharide;

Accept maltose is made of two glucose/ monosaccharides

2. (Time to be) hydrolysed into glucose

OR

(Time to) break glycosidic bond(s);

Accept monosaccharides for glucose

2

(d) **This method would be less accurate because**

1. Colour/endpoint is subjective;

Accept descriptions of the word 'subjective'

The accuracy of this method could be improved by

2. (Have a) colour standard (of the yellow) as a reference for the end point;

OR

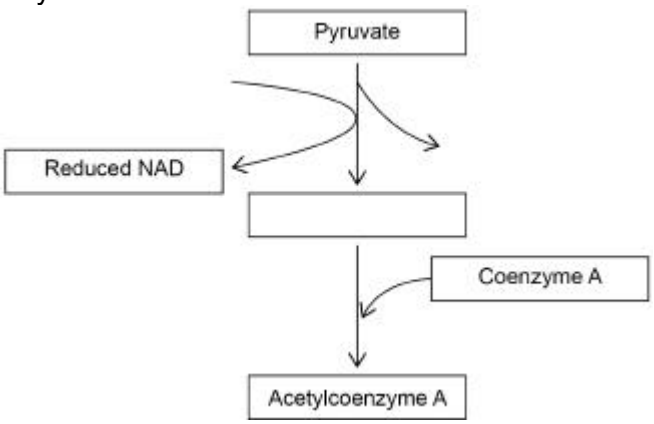
(Have a) colorimeter/absorbance/transmission reading (of the yellow) as a reference for the end point;

Accept use a colorimeter to time how long it takes to reach a certain value/absorbance/ transmission

Ignore any references to coloured filters used in a colorimeter

2

(e) All 4 correct **= 2 marks**;;
Any 2 or 3 correct **= 1 mark**



Accept pyruvic acid for pyruvate

For reduced NAD accept NADH, NADH + H^+ or $NADH_2$

*For reduced NAD reject reduced NAD**P** /*

*NAD**P**H / NAD**P**H_2/*

*NAD**P**H + H^+*

For acetylcoenzyme A accept acetyl co A

2

[9]

Q3.

(a) Automarked question − ☑ Reduction of pyruvate (Box 3)

1

(b) 1. Oxygen/O_2 taken up/used (by seeds);

2. Carbon dioxide/CO_2 (given out) is absorbed by solution/potassium hydroxide/KOH;

3. Decrease in pressure/volume (of air inside);

Ignore 'negative pressure' but reject reference to vacuum.

Accept 'air pressure higher than inside'.

3

(c) 1. Distance (drop/liquid moves);

Accept description of distance, e.g. 'start and end position'.

2. Diameter/radius/bore of tubing/lumen

Accept (cross-sectional) area of tubing/lumen.

Ignore time.

2

(d) 1. Remove potassium hydroxide/KOH

OR

Remove solution which removes carbon dioxide.

OR

Replace potassium hydroxide/KOH with water;

Reject if seeds removed or another organism used.

2. Record distance liquid moves (without potassium hydroxide);

Reject moves to the right.

Accept 'liquid would not move'.

3. Use difference in distance liquid moves (with potassium hydroxide and without potassium hydroxide)

OR

Use difference in (calculated) volumes (with potassium hydroxide and without potassium hydroxide);

Accept 'if liquid does not move (volume of) carbon dioxide produced is the same as (volume of) oxygen used'.

Answers which add/use a syringe, reject mp2 ***and*** *mp3.*

3

(e) Answer in the range 3×10^{-7} to 3.33×10^{-7};

Accept equivalent answers in this range which are not in standard form.

Accept 3.0×10^{-7}

Ignore any numbers after 3.33.

1

[10]