**Q 2016 7 (b) (iv)**

When immobilising an enzyme you used a gel substance to trap the enzyme. You also used a second substance to make the gel insoluble.

* 1. Name the gel substance you used to trap the enzyme.
  2. Name the second substance you used to make the gel insoluble.

**MS 2016 7 (b) (iv)**

|  |  |  |
| --- | --- | --- |
| (iv) | 1. | *Gel:* (Sodium) alginate |
|  | 2. | *To make gel insoluble:* Calcium chloride |

**Q 2015 7 (c)**

1. In relation to an investigation you carried out into heat denaturation of an enzyme, answer the following:
   1. Name the enzyme you used
   2. Name the enzyme’s substrate.
   3. Name the product(s) formed.
2. How did you denature the enzyme?
3. How did you know that the enzyme had been denatured?
4. Why are buffers needed when carrying out experiments with enzymes in school?

**MS 2015 7 (c) (i)**

1. Catalase or Pepsin or Amylase
2. Hydrogen Peroxide **or** Protein **or** Starch
3. Oxygen and water or Peptides (or amino acids) or Maltose
4. Boil **or** heat to high temperature (≥ 60 oC)
5. negative result for named test for product

**or** positive result for named test for substrate [*must match enzyme* ***or*** *product in c (i) above*]

1. To maintain (a constant) pH **or** to vary pH

**Q 2013 8**

1. (a) (i) What term is used for the substance(s) that result(s) from the action of an enzyme on its substrate?

(ii) In relation to an enzyme, explain the term *optimum activity*

1. Answer the following in relation to an activity that you carried out to investigate the effect of heat denaturation on the activity of an enzyme.
   1. Name the enzyme **and** the substrate that you used.
   2. Describe how you carried out the investigation.

In your description outline how you measured the activity of the enzyme.

* 1. Using suitably labelled axes, draw a graph of the results that you obtained.

**MS 2013 8**

|  |  |
| --- | --- |
| **8.** (a) (i) Product(s)  (ii) Working at maximum rate | **3**  **3** |
| 1. (i) Named enzyme   Matching substrate   * 1. Temperature ≥ 60oC for ≥ 5 min **or** boil / water bath **or** described / untreated enzyme / as control / no activity in denatured enzyme / (matching method of) observe activity / control result /   named factor (kept constant) / how kept constant   * 1. Any attempt | **3**  **3**  **5(3)**  **3** |

**Q 2012 9**

Answer the following in relation to enzymes.

1. What is their chemical nature?
2. Comment upon their molecular shape.
3. Answer the following in relation to an investigation that you carried out into the effect of temperature on the rate of enzyme action.
   1. Name the enzyme that you used.
   2. Name the substrate of this enzyme.
   3. Why was it necessary to keep the pH constant in the course of the investigation?
   4. How did you keep the pH constant?
   5. How did you vary the temperature in the course of the investigation?
   6. How did you know that the enzyme was working?
   7. Use the axes below to summarise the results of your investigation. Do this by
      1. labelling the axes,
      2. drawing a graph to show how the rate of enzyme action varied with temperature.

**MS 2012 9**

|  |  |
| --- | --- |
| **9.** (a) (i) Protein | **3** |
| (ii) Folded | **3** |
| (b) (i) Name of enzyme | **3** |
| (ii) Matching substrate | **3** |
| (iii) To eliminate it as a possible influence on rate **or** only one variable | **3** |
| (iv) Buffer | **3** |
| (v) Water baths **or** water bath at different temperatures | **3** |
| (vi) Description of visible result matching enzyme (or substrate) | **3** |
| (vii) 1. y-axis = Rate and x-axis = Temperature  2. | **3**  **3** |

**Q 2009 9**

1. (a) (i) To which group of biomolecules do enzymes belong?

(ii) Name a factor that influences the activity of an enzyme.

1. In the course of your practical investigations you prepared an enzyme immobilisation. Answer the following questions in relation to that investigation.
   1. Describe how you carried out the immobilisation.
   2. In the space provided draw a labelled diagram of the apparatus that you used to investigate **the activity** of the immobilised enzyme
   3. Briefly outline how you used the apparatus referred to in (b) (ii) above.

**MS 2009 9**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **9.** | (a) | (i)  (ii) | Proteins  Temperature **or** pH | **3**  **3** |
|  |  |  |  |  |
|  | (b) | (i) | Named enzyme [*accept* yeast] / mix (or stir) / with alginate / add to CaCl2 soln. / how added / (allow to) harden | **3(3)** |
|  |  | (ii) | *Diagram*: | **2,0** |
|  |  |  | *Labels*: named substrate / enzyme [*accept* yeast] **or** beads / named product / any one apparatus label | **2(2)** |
|  |  | (iii) | Add substrate (to immobilised enzyme) / test for named product / how tested / test at set intervals **or** control described | **3(3)** |

**Q 2008 9**

* 1. What is meant by an enzyme’s optimum pH?
  2. What is a denatured enzyme?.

1. In the course of your studies you investigated the effect of denaturation by heat application on the activity of an enzyme.
   1. Name the enzyme that you used

(ii) What substrate did you use?

1. Describe how you carried out the investigation. In your answer you must refer to the way that you measured the enzyme’s activity.
2. State the results that you obtained.

**MS 2008 9**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **9.** | (a) | (i) | (pH at which enzyme) works best | **3** |
|  |  | (ii) | Loss of (enzyme) function (or activity) | **3** |
|  |  |  |  |  |
|  | (b) | (i) | name of enzyme | **3** |
|  |  | (ii) | name of substrate (must match if enzyme named) | **3** |
|  |  | (iii) | how activity measured (must match enzyme or match substrate) | **3** |
|  | other procedures: |  |
|  | how heated / how long / addition (of **or** to substrate) / control |  |
|  | described / suitable condition **or** example (for both experiment and | **3(3)** |
|  | control) |  |
|  |  | (iv) | Result of experiment and result of control | **6, 0** |

**Q 2007 7**

|  |  |  |
| --- | --- | --- |
| **7.** (a) | (i) | What is meant by an enzyme? |
|  |  |  |
|  | (ii) | Give an example of a protein that has a **structural** role.. |

1. Answer the following questions in relation to an investigation that you carried out to determine the effect of temperature on enzyme action.
   1. Name the enzyme that you used.
   2. Name the substrate of the enzyme.
   3. State one factor that you kept constant during the investigation
   4. How did you keep this factor constant?
   5. How did you vary the temperature?
   6. How did you measure the rate of activity of the enzyme?
   7. What was the result of your investigation?

**MS 2007 7**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q 7.** | **(a)** | **(i)** | biological or organic or metabolic or protein catalyst **or** explained | **3** |
|  |  | **(ii)** | keratin **or** myosin **or** other correct | **3** |
|  | **(b)** | **(i)** | name of enzyme | **3** |
|  |  | **(ii)** | name of matching substrate | **3** |
|  |  | **(iii)** | pH **or** substrate concentration **or** enzyme concentration [*allow* amount] | **3** |
|  |  | **(iv)**  **(v)**  **(vi)**  **(vii)** | buffer **or** same volume **or** same amount  water baths **or** described **or** water bath at different temperatures **or**  described  time / change e.g. colour, foam, etc  **or** data logger / sensor named  activity varies with temperature **or** reference to activity at a particular temperature | **3**  **3**  **2(3)**  **3** |

**Q 2005 7**

Immobilised enzymes are sometimes used in bioreactors.

(i) What is a bioreactor?

(ii) State **one** advantage of using an immobilised enzyme in a bioreactor.

1. Answer the following questions in relation to an experiment that you carried out to immobilise an enzyme and use that immobilised enzyme.
   1. Name the enzyme that you used
   2. Draw a labelled diagram of the apparatus that you used to immobilise the enzyme
   3. Describe how you used this apparatus to immobilise the enzyme. In your answer name the solutions that you used and explain their purpose.
   4. Describe briefly how you used the immobilised enzyme.

**MS 2005 7**

|  |  |  |  |
| --- | --- | --- | --- |
| **7.** (a) | (i) | A vessel / container / named industrial example e.g. vat | **3** |
|  | (ii) | (Enzyme) - can be recovered | **3** |
| (b) | (i) | Name of enzyme / yeast | **3** |
|  | (ii)  (iii) | Diagram of apparatus (2 pieces) + one label Use of apparatus e.g. beaker/ stirrer/ syringe  Names of solutions e.g sodium alginate/ calcium chloride Purpose e.g. to trap enzyme/ form beads  Sodium alginate / calcium chloride are compulsory points any four *– at least one from each* | **3**  **4(3)** |
|  | (iv) | Named substrate or named product / comment on procedure | **2(3)** |