1. Which best describes an enzyme?

   ☐ a globular protein that catalyses a reaction and is not used up

   ☐ a fibrous protein that gives support

   ☐ a carbohydrate that is broken down in the reaction

   ☐ a lipid used up as the reaction goes

2. Why is the initial rate (slope at time zero) the fairest value to compare?

   ☐ the reaction is fastest then, with the most substrate present

   ☐ the enzyme has not yet started to work

   ☐ the reaction has stopped, so the reading is steady

   ☐ all the product has already been made

3. What does V_max represent?

   ☐ the rate with no enzyme

   ☐ the maximum rate, reached when all active sites are occupied

   ☐ the optimum temperature

   ☐ the substrate concentration at the start

4. Select **all** the correct statements about where enzymes work.

   ☐ Catalase breaks down hydrogen peroxide **inside** the cell (intracellular)

   ☐ An extracellular enzyme works inside the cell that made it

   ☐ Amylase is **secreted** to digest starch outside the cell (extracellular)

   ☐ Because it is a catalyst, an enzyme is not used up and works repeatedly

   Tick every correct option.

5. Above the optimum temperature, the rate falls steeply because the enzyme:

   ☐ denatures, so the active site loses its shape

   ☐ becomes a substrate for another enzyme

   ☐ gains more kinetic energy and collides less

   ☐ is used up by reacting with the substrate

6. An enzyme has V_max = 80 units. At a substrate concentration equal to its Km, what is the rate?

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7. An enzyme is specific because:

   ☐ it can bind any molecule that collides with it

   ☐ it is made of carbohydrate, which fits one sugar

   ☐ it is used up by reacting with its substrate

   ☐ its active site is complementary in shape to only one substrate

8. To stop pH changing while you vary temperature, keep it constant with a _____ solution.

   _____

9. A LOW Km means the enzyme only reaches half its maximum rate at a HIGH substrate concentration.

   ☐ True ☐ False

10. In the induced-fit model the active site is completely rigid and never changes shape.

    ☐ True ☐ False

1. **a globular protein that catalyses a reaction and is not used up**

   Enzymes are globular protein catalysts: they speed reactions and are not used up, so each one works again and again.

2. **the reaction is fastest then, with the most substrate present**

   At the start the most substrate is present, so the rate is highest and not yet limited by substrate running out.

3. **the maximum rate, reached when all active sites are occupied**

   V_max is the top rate; the curve flattens there because every active site is busy.

4. **Catalase breaks down hydrogen peroxide inside the cell (intracellular); Amylase is secreted to digest starch outside the cell (extracellular); Because it is a catalyst, an enzyme is not used up and works repeatedly**

   Catalase is intracellular and amylase is extracellular. Extracellular means it works **outside** the cell, so the third statement is false.

5. **denatures, so the active site loses its shape**

   Heat breaks the bonds holding the enzyme's shape; the active site changes and can no longer bind the substrate.

6. **40 units**

   By definition Km is the substrate concentration that gives **half** of V_max, so the rate is $80 \div 2 = 40$ units.

7. **its active site is complementary in shape to only one substrate**

   Specificity comes from the active site's shape being complementary to one substrate and no other.

8. **buffer**

   A buffer resists pH change, so pH stays controlled while temperature is the only variable.

9. **False**

   The opposite: low Km means half-speed is reached at LOW substrate – a high affinity, gripping the substrate tightly.

10. **False**

    That describes lock-and-key. In induced fit the active site moulds around the substrate as it binds – a tighter grip that fits the evidence better.

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