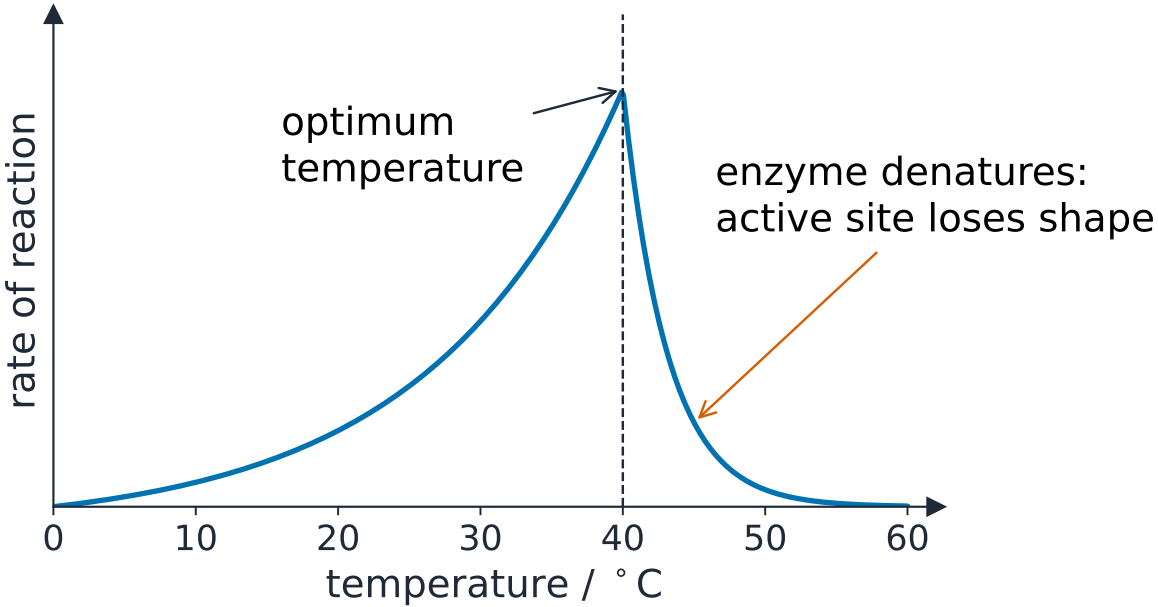
Exercise walk-through

3.2 Environmental Impacts on Enzyme Function

AP Biology

Temperature: rate rises to an optimum, then falls



rate of an enzyme reaction against temperature

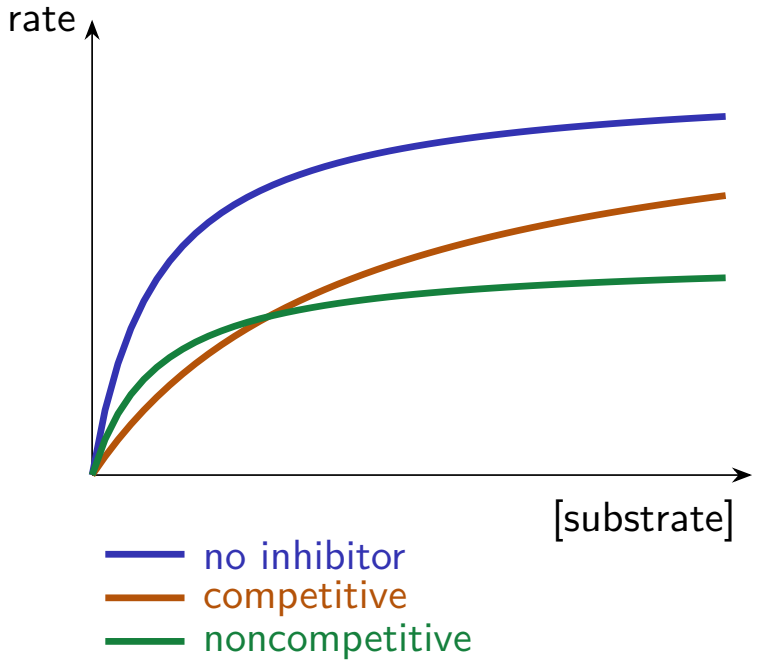
Below the **optimum** : more kinetic energy, more successful collisions. Past it, the protein **denatures** : the active site loses its shape and the rate falls.

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Substrate and inhibitors

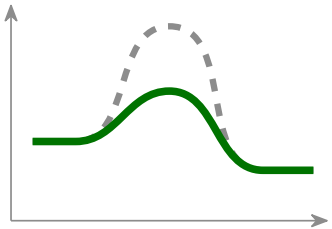
More substrate speeds the reaction until every enzyme is **saturated** .

inhibitor	**how it acts**
competitive	blocks the active site; more substrate overcomes it
noncompetitive	binds elsewhere, reshapes the site
feedback	the end product shuts off step 1



Check yourself

1. How does an enzyme speed up a reaction?
2. What molecule carries energy for the cell?
3. Which organelle carries out photosynthesis?
4. Aerobic respiration yields how many ATP vs fermentation?



Answers **1.** it lowers the activation energy **2.** ATP **3.** the chloroplast **4.** ∼30 vs 2

Exercises 2.1·2.3

2.1 What happens to an enzyme's shape at very high temperature? [1]

2.2 What is meant by an enzyme's optimum pH? [1]

2.3 Why does rate level off at high substrate concentration? [1]

Exercises 2.1·2.3

2.1 What happens to an enzyme's shape at very high temperature? [1]

2.1

- It denatures (the active site loses its shape)

2.2 What is meant by an enzyme's optimum pH? [1]

2.2

- The pH at which the enzyme works fastest

2.3 Why does rate level off at high substrate concentration? [1]

2.3

- All the active sites are occupied (saturated), so more substrate cannot be processed faster

Exercise 3.1

3.1 Above its optimum temperature, an enzyme's rate falls sharply because the enzyme [1]

- [ ] **A** speeds up
- [ ] **B** denatures
- [ ] **C** gains substrate
- [ ] **D** freezes

Exercise 3.1

3.1 Above its optimum temperature, an enzyme's rate falls sharply because the enzyme [1]

- ☐ **A** speeds up
- **B** denatures
- **C** gains substrate
- **D** freezes

3.1 B

- denatures

Exercise 3.2 (a)

3.2 An enzyme's activity is measured at pH 2, 7, and 11, with the highest activity at pH 7.

(a) State the optimum pH. [1]

Exercise 3.2 (a)

3.2 An enzyme's activity is measured at pH 2, 7, and 11, with the highest activity at pH 7.

(a) State the optimum pH. [1]

(a)

- pH 7

Exercise 3.2 (b)

3.2 An enzyme's activity is measured at pH 2, 7, and 11, with the highest activity at pH 7.

(b) Explain why activity is low at pH 2 and pH 11. [2]

Exercise 3.2 (b)

3.2 An enzyme's activity is measured at pH 2, 7, and 11, with the highest activity at pH 7.

(b) Explain why activity is low at pH 2 and pH 11. [2]

(b)

- At pH 2 and 11 the active site's shape is disrupted (or the enzyme denatures), so the substrate no longer fits and the rate falls

Exercise 3.3

3.3 Describe and explain the shape of a graph of reaction rate against substrate concentration. [3]

Exercise 3.3

3.3 Describe and explain the shape of a graph of reaction rate against substrate concentration. [3]

3.3

- Rate rises steeply with substrate at first (more collisions with active sites), then levels off once all active sites are saturated, so adding more substrate has no further effect