# TERM 1: WEEK 9 – 10 (30th March – 10th April)

# Strand 1: Cellular Biology

## Sub-strand 1.3 Enzymes

### Lesson Activity 1.3

**The specific learning outcomes (SLO) targeted in this activity are provided below:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Specific Learning Outcomes:** Students are able to  | **Skill level** | **SLO code**  | **Achieved****(Yes / No)** |
| Define biological catalyst | 1 | Bio1.3.1.1  |  |
| Define enzyme | 1 | Bio1.3.1.2  |  |
| Define substrate | 1 | Bio1.3.1.3  |  |
| State where the enzymes are found | 1 | Bio1.3.1.4  |  |
| Describe the biological function of enzymes | 2 | Bio1.3.2.1 |  |
| Describe the role of enzymes | 2 | Bio1.3.2.2 |  |
| Explain the induced fit model | 3  | Bio1.3.3.1 |  |
| Describe the dual specificity of enzymes: substrate specificity and specificity of action using the induced fit model | 2 | Bio1.3.2.3 |  |
| Explain that enzymes are effective biological catalyst | 3 | Bio1.3.3.2 |  |
| Explain how a certain environmental factor (temperature, pH, substrate concentration, co-factors, and inhibitors) can affect the functioning of a named enzyme | 3 | Bio1.3.3.3 |  |
| Discuss the graphs and diagrams of how activity of enzyme is affected by environmental factors | 4 | Bio1.3.4.1 |  |

**Instructions:**

1. Read Chapter 7: Cell processes – enzyme activity, pages 63 – 66.
2. If you have access to the internet, refer to Central School’s website: [www.centralschool.edu.vu](http://www.centralschool.edu.vu); Year 11 Biology folder Term 1 Week 9 – 10, to watch videos on enzyme activity and to access other resources.
3. Answer the following questions.
4. Define the following terms (refer to textbook page 63):

a. biological catalyst

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b. enzyme

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c. substrate

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1. State where the enzymes are found (refer to textbook page 63).

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1. Describe the biological function of the following enzymes (refer to text book pages 63 and 65):
2. *Lipase*

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1. *Maltase*

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1. *Peroxidase*

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1. *Pepsin*

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1. *Amylase*

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1. Describe the role of enzymes (refer to textbook page 63).

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1. Explain the induced fit model (refer to textbook page 63 and 64).

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1. Describe the dual specificity of enzymes (refer to textbook page 63).

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1. Explain why enzymes are effective biological catalyst.

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1. Explain how the function of an enzyme in humans is affected by temperature below 370C and above 370C (refer to textbook page 64 and 65).

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1. The enzyme *amylase* is found in saliva. The optimum (works well) pH for *amylase* is about 7 (neutral condition). Explain how *amylase* activities are affected by pH7, pH4 and above pH7 (refer to textbook page 65).

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1. The enzyme *pepsin* is found in the stomach. The optimum pH for *pepsin* is about 2 (acidic condition). Explain how *pepsin* activities are affected by pH1, pH2 and above pH2 (refer to textbook page 65).

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1. The enzyme *pancreatic lipase* is found in the small intestine. The optimum pH for *lipase* is about 9 (slightly basic condition). Explain how *pepsin* activities are affected by pH6, pH9 and above pH9 (refer to textbook page 65).

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1. Explain how enzyme activities are affected by substrate concentration (refer to textbook page 65).

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1. Explain how enzyme activities are affected by co-factors (refer to textbook page 66).

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1. Explain how enzyme activities are affected by inhibitors (refer to textbook page 66).

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1. The graph below shows the effects of temperature on the rate of activity of a particular enzyme found in human cells.



*(Source :* [*https://www.chegg.com/*](https://www.chegg.com/)*)*

Use the graph to discuss the effects of temperature on the rate of activity of this particular enzyme. Your answer must include the following points:

* rate of enzyme activity at 100C;
* rate of enzyme activity as temperature increases from 100C – 350C;
* rate of enzyme activity at 350C – 390C;
* rate of enzyme activity as temperature increases above 390C;
* rate of enzyme activity at 450C.

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1. The graph below shows the effects of pH on the rate of activity of a particular enzyme.



(Source : <https://www.chegg.com/>)

Use the graph to discuss the effects of pH on the rate of activity of this particular enzyme. Your answer must include the following points:

* rate of enzyme activity at pH2;
* rate of enzyme activity as pH increases from 2 – 4;
* rate of enzyme activity at pH5;
* rate of enzyme activity as pH increases above 5;
* rate of enzyme activity at pH9.

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