

Effect of various factors on polyphenol oxidase activity

BCH303 [Practical]

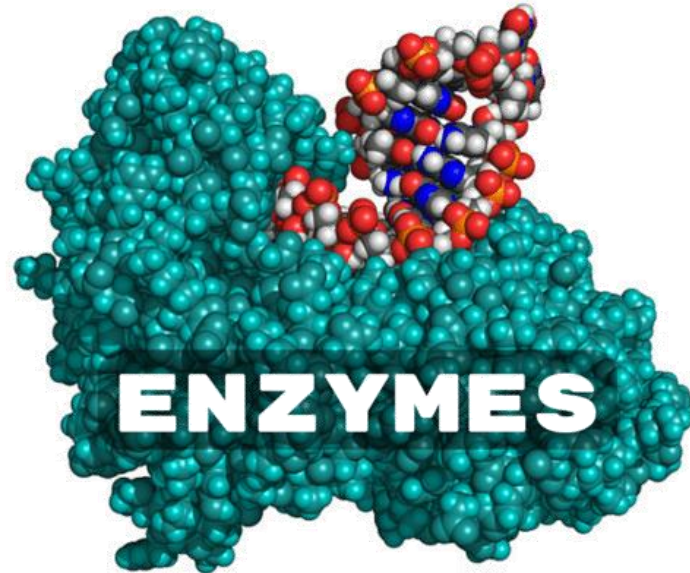
Catalyst:

- A substance that speeds up a chemical reaction.
- Not consumed in the reaction.
- The catalysts for biochemical reactions that occur in the living organisms are called **enzymes.**

Enzymes:

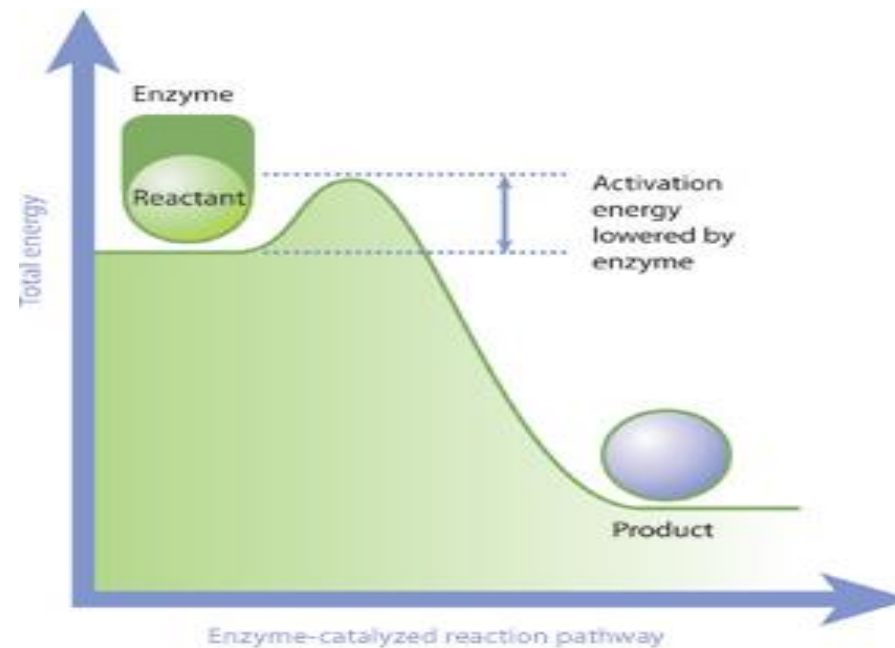
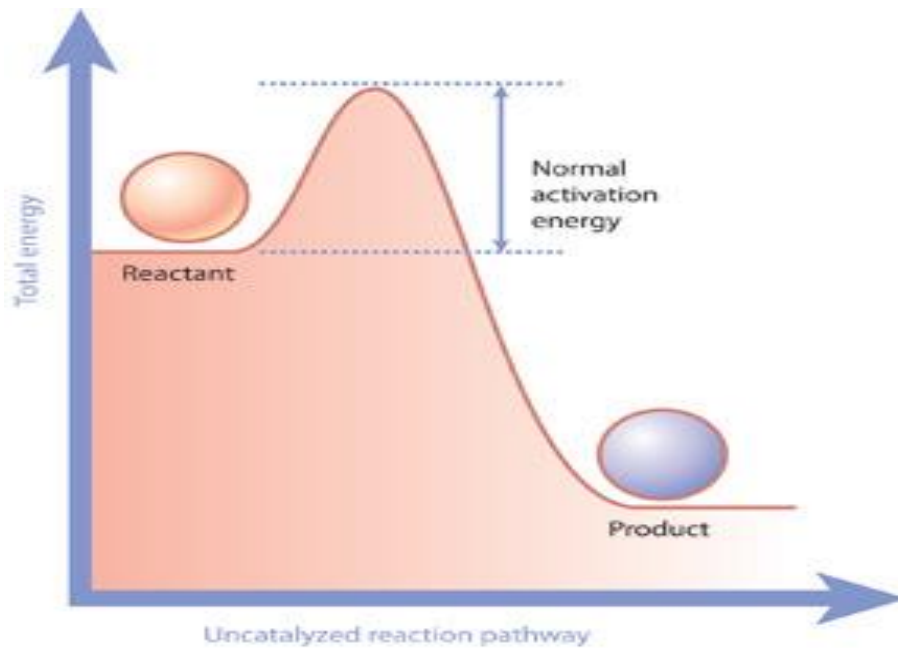
- Highly specialized **proteins**.
- Protein and RNA.
- -ase.
- Accelerate chemical reactions (INCREASE RATE OF REACTION).

→ **HOW ?**



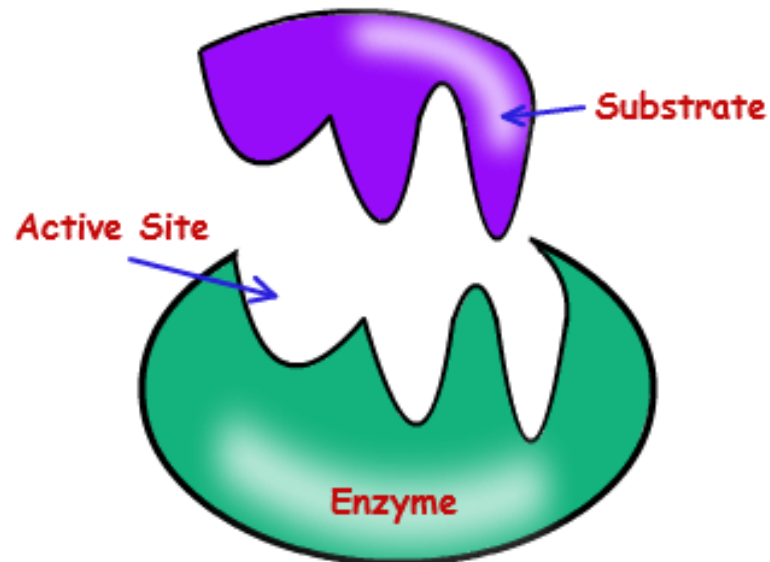
How can enzyme increase the rate of a biochemical reactions ?

- Enzymes perform the critical task of lowering a reaction's activation energy.

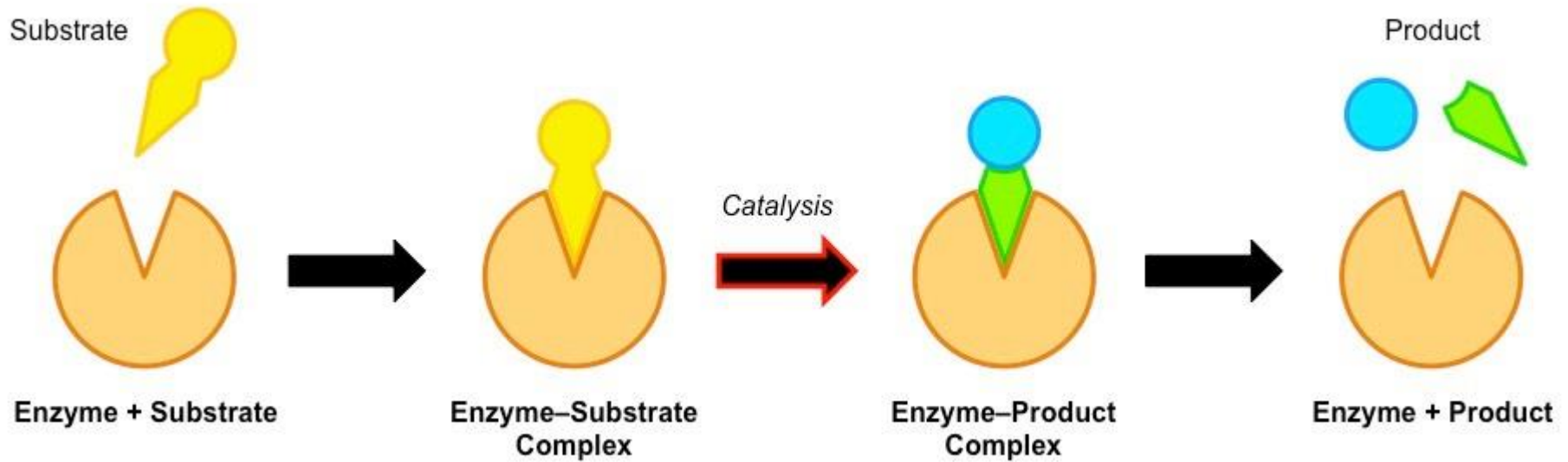


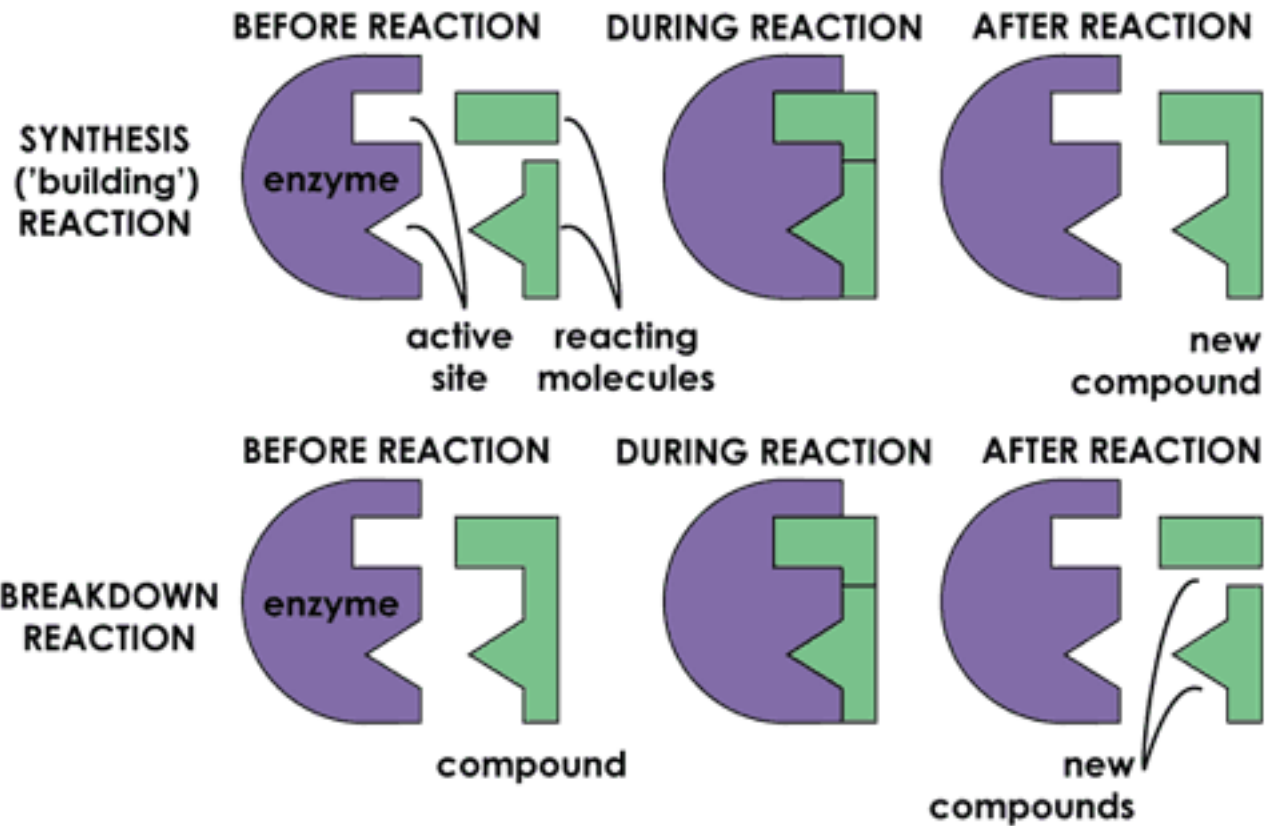
Enzyme active site and substrate:

- The distinguishing feature of an enzyme-catalyzed reaction is that it takes place within the confines of a pocket on the enzyme called the active site.
- To catalyse a reaction, an enzyme will bind to one or more reactant molecules. These molecules are the enzyme's substrates



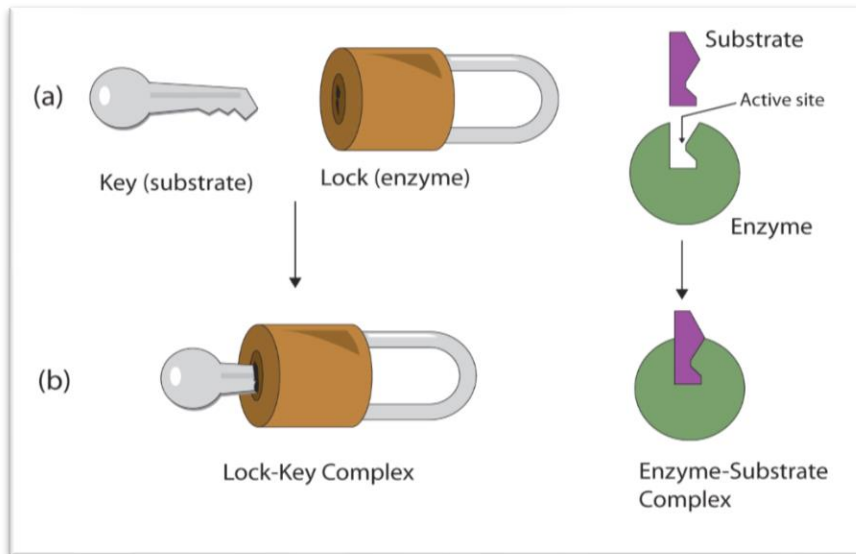
Enzymatic reaction :



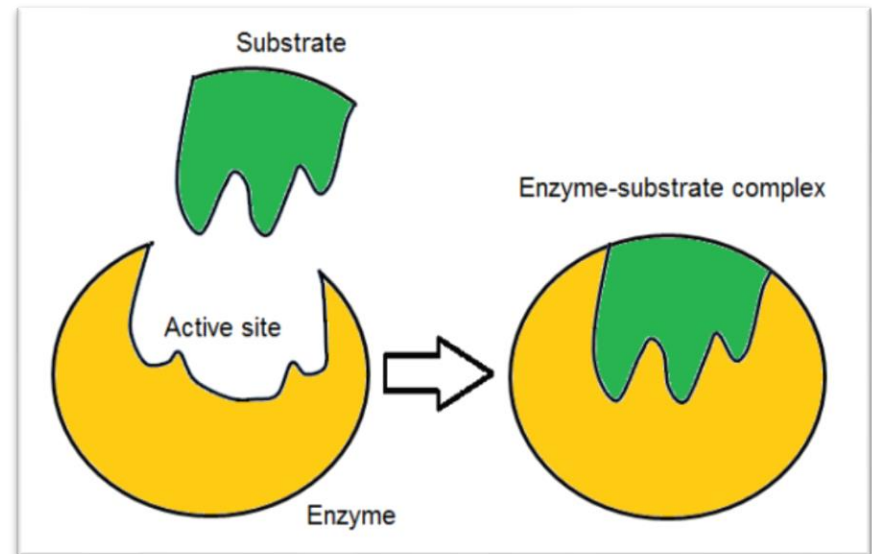


How can substrate bind to the Enzyme?

(1)



(2)



Importance of studying enzymes:

- Diseases.
- Food.
- Agriculture.
- Chemical industry.
- ..etc

Enzyme browning :

- This occurs when the phenolic compounds present in them react with **polyphenol oxidase**.



Polyphenol oxidase (PPO):

- Is a **copper-containing enzyme** that catalyse the oxidation of dihydroxy- and trihydroxy phenol to corresponding quinone which has a **brown color**.
- In this lab, activity of polyphenol oxidase extracted from **potato will be examined qualitatively**.



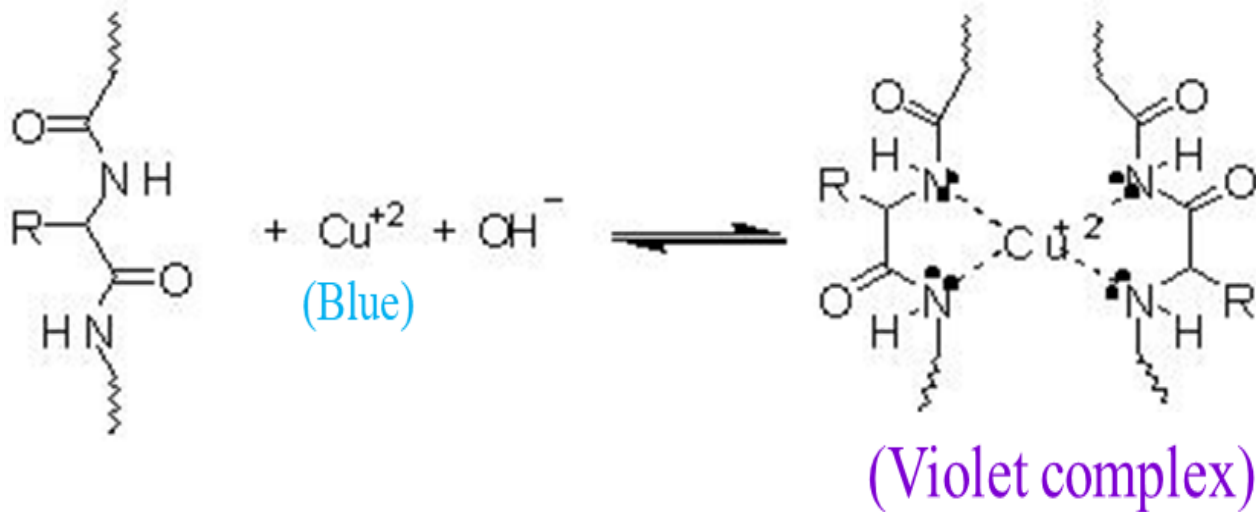
Practical part

Experiment (1): Examine the protein nature of polyphenol oxidase

Aim:

- Examine the protein nature of polyphenol oxidase by biuret test.

Principle:

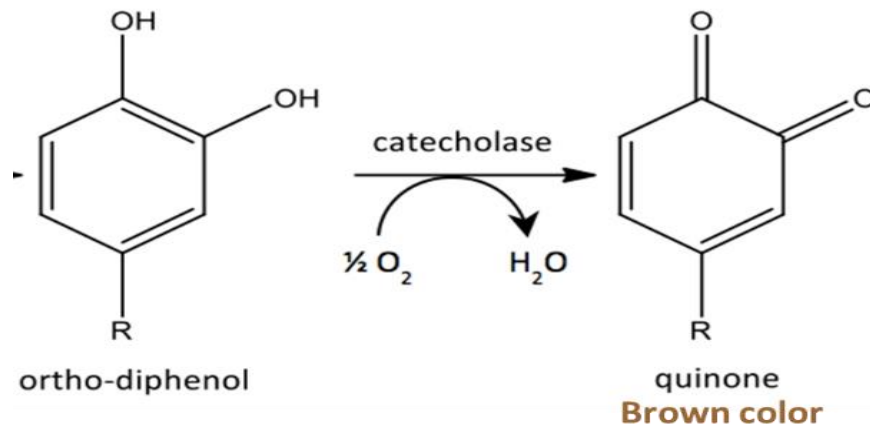


Experiment (2): Test the activity of polyphenol oxidase

Aim:

- To demonstrate activity of the enzyme.
- To investigate the effect of incubation time on enzyme activity.

Principle:



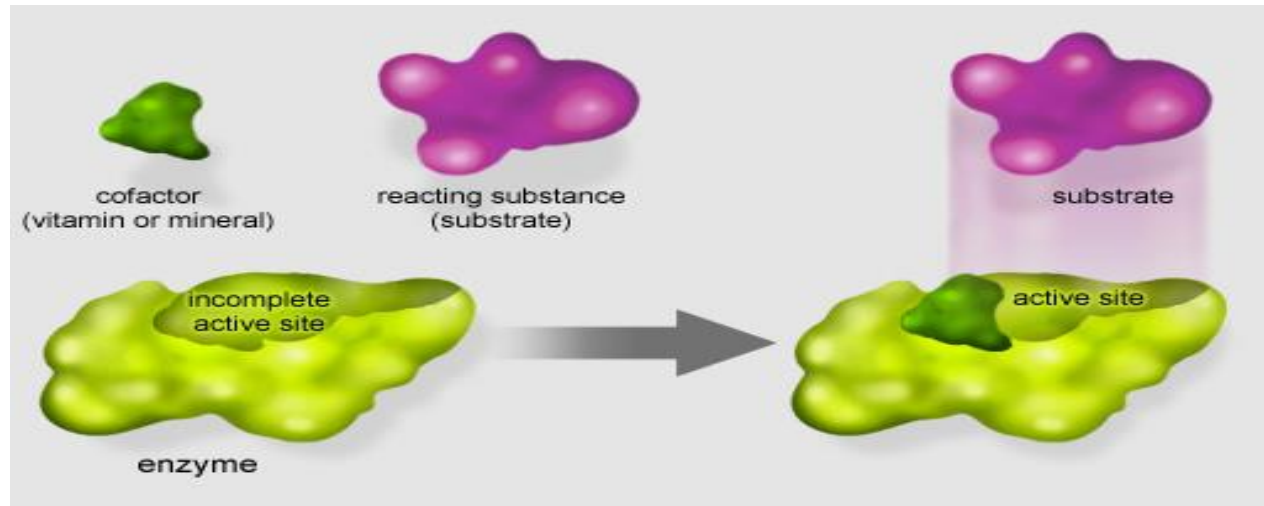
Experiment (3): Demonstrate the chemical nature of polyphenol oxidase

Aim:

- To examine the chemical nature of polyphenol oxidase.

Principle:

- pH.
- Cofactor.

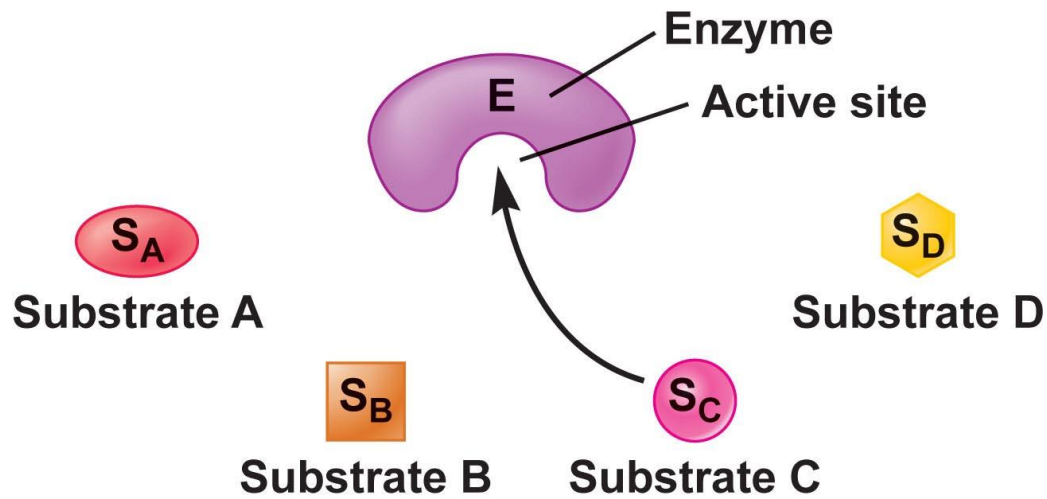


Experiment (4): Investigating the substrate specificity of polyphenol oxidase

Aim:

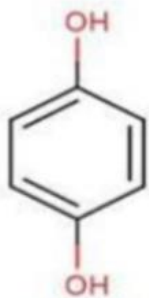
- To investigate the substrate specificity of the enzyme using structurally related chemicals.

Principle:

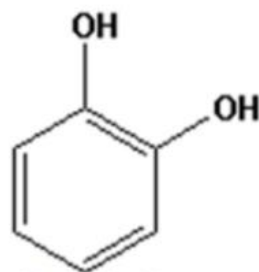


(b)

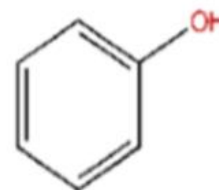
- The three compounds (mono- and di-hydroxyl phenol) will be used to find out which one of them is a substrate for PPO.



Hydroquinone



Catechol



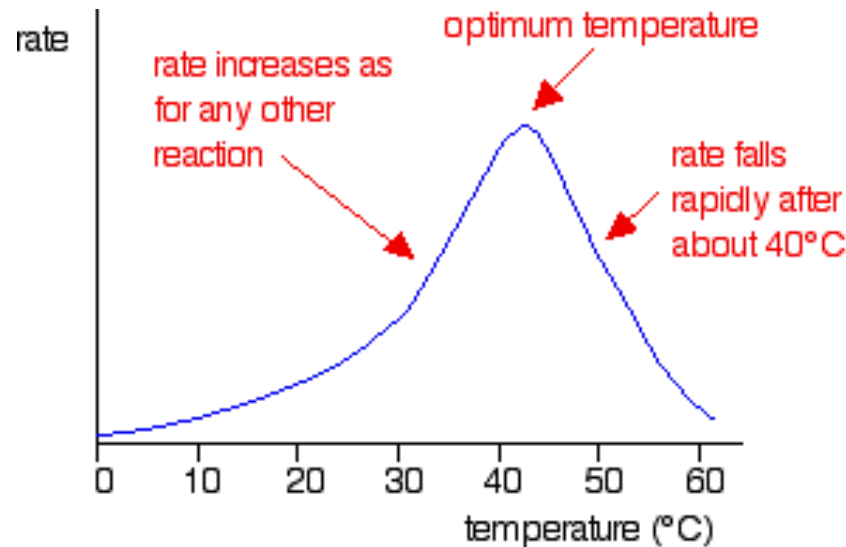
Phenol

Experiment (5): Investigating the effect of temperature on polyphenol oxidase activity

Aim:

- To investigate the effects of temperature on the enzyme activity.

Principle:



Home Work:

Search for an application of enzymes in the industry.