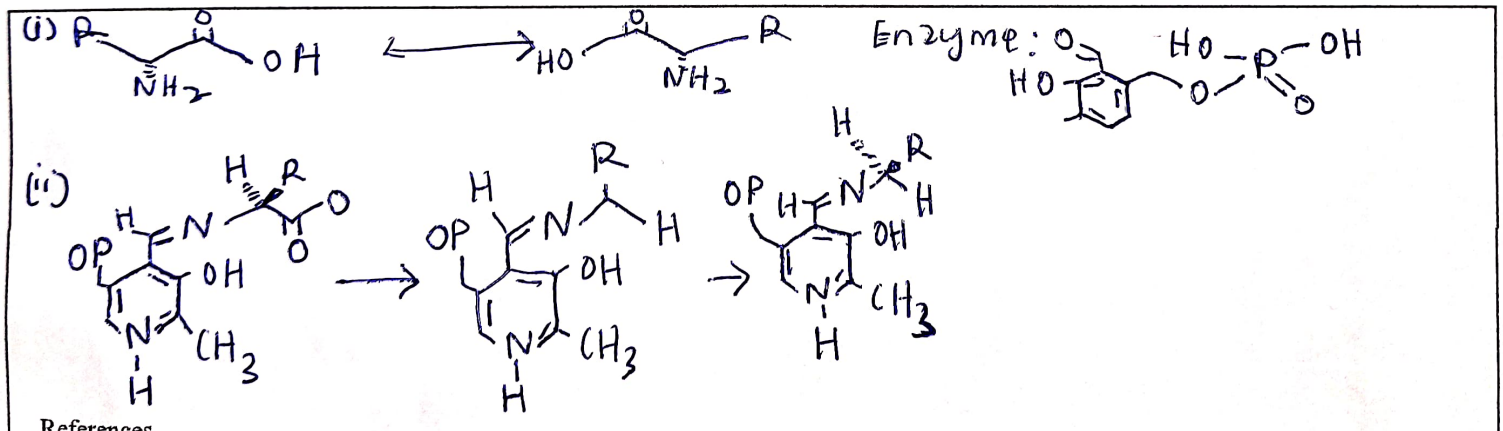
Your Name:

Imines are important biochemical functional groups that are utilized in several amino acid metabolizing enzymes that require Pyridoxal 5'-phosphate (PLP), a vitamin B6-derived cofactor. These enzymes are important especially in your brain as well as other organs. The enzymes work by forming a stable imine in the protein active site between a lysine residue and PLP.

1. (a) For each general type of transformation indicated below, indicate a specific PLP-dependent enzyme that will do each one. Then complete each scheme to show your peers the structure of the generic amino acid that would be expected after each transformation. Include an actual scientific literature reference for each. There are many scientific journals out there that can be referenced but the reference should be of an actual paper published within the last 5 years. Your reference should include: Journal Name, year, and First Author.

(i) Racemization

(iii) Decarboxylation



References

Ashida, H., Sawa, Y., & Yoshimura, T. (2021). Enzymatic determination of D-alanine with L-alanine dehydrogenase and alanine racemase. *Bioscience, Biotechnology, and Biochemistry*, *85*(11), 2221-2223.

https://academic.oup.com/bbb/article-abstract/85/11/2221/6356949

Gayathri, S. C., & Manoj, N. (2020). Crystallographic snapshots of the Dunathan and Quinonoid intermediates provide insights into the reaction mechanism of group ii decarboxylases. *Journal of Molecular Biology*, *432*(24), 166692. https://www.sciencedirect.com/science/article/pii/S0022283620306033

(b) Choose one of your literature sources and write a very concise overview of the study. You don't need to get into all the technical aspects of the study but discuss what the goal of the study was, the significance of the study (why is it important?), and what the big picture conclusions of the study were. Make sure to include the reference of the paper you are writing a short synopsis for.

When you are doing your two peer reviews, ask two questions that were not answered from the synopsis you are reviewing. Then, ask for a response from these individuals that at least try to address the questions you have asked.

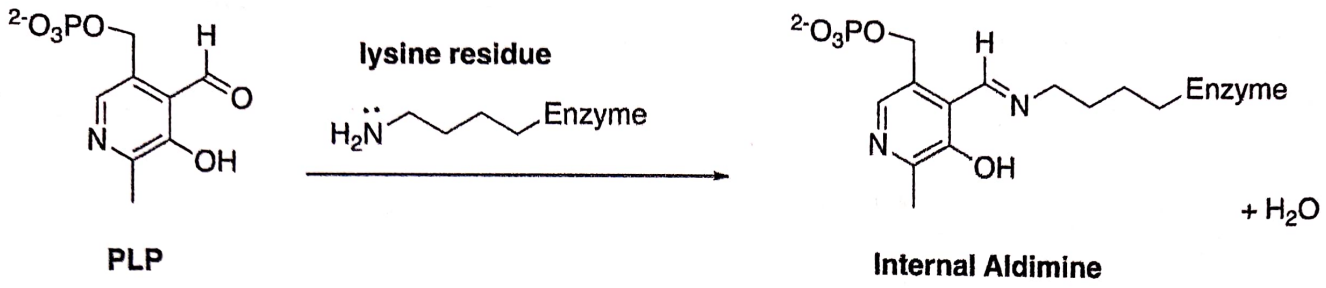
Ashida et al. (2021) conducted a study to determine the D-ala contents of 7 crustaceans. These crustaceans included crabs and lobsters. The researchers constructed an enzymatic assay system of D-amino acids using alanine racemase. D-ala was the identified amino-acid in the crustaceans. The study showed that crustaceans have a large amount of D-ala which improves their taste.

References

Ashida, H., Sawa, Y., & Yoshimura, T. (2021). Enzymatic determination of D-alanine with L-alanine dehydrogenase and alanine racemase. *Bioscience, Biotechnology, and Biochemistry*, *85*(11), 2221-2223.

https://academic.oup.com/bbb/article-abstract/85/11/2221/6356949

2. Draw an arrow-pushing mechanism illustrating how the imine forms between the enzyme lysine and PLP. The structures below can be used as your starting point. In your reviews, comment on any steps that you thing are incorrectly illustrated so they can be fixed.



PLP **Internal Aldimine**