

## 17.S: The Organic Chemistry of Vitamins (Summary)

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After completing this chapter, you should be able to:

- Understand how pyridoxal phosphate (PLP) acts as an 'electron sink' in a variety of reactions in amino acid metabolism.
- Recognize and draw mechanisms for PLP-dependent transformations of the following types:
  - racemization
  - decarboxylation
  - transamination
  - retroaldol cleavage
  - retro-Claisen cleavage
  - $\beta$ -elimination
  - $\beta$ -substitution
  - $\gamma$ -elimination
  - $\gamma$ -substitution
- Recognize transformations - amino acid decarboxylation and transamination, for example - in which chemical steps occur that simply don't 'make sense' unless the electron sink role of PLP is taken into account.
- Understand how the orientation of the substrate in relation to the plane formed by the conjugated  $\pi$  system of PLP is a major factor in catalysis of PLP-dependent reactions.
- Understand how thiamine diphosphate (*ThDP*) acts as an 'electron sink' in a variety of reactions in which a bond to a carbonyl carbon is broken, and how these steps do not 'make sense' unless the electron sink role of *ThDP* is taken into account.
- Recognize transformations for which *ThDP* is likely required, and be able to draw reasonable mechanisms for them.
- Understand how *ThDP* acts in tandem with lipoamide, flavin, and nicotinamide in the reaction catalyzed by pyruvate dehydrogenase.
- Recognize folate in its various forms - *DHF*, *THF*, *f-THF*,  $CH_2-THF$ , and  $CH_3-THF$  - functions in a variety of one-carbon transfer steps. Be able to recognize the oxidation state of the carbon being transferred in a folate-dependent step.

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