



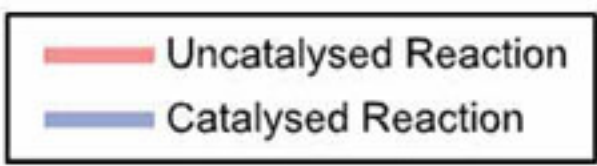
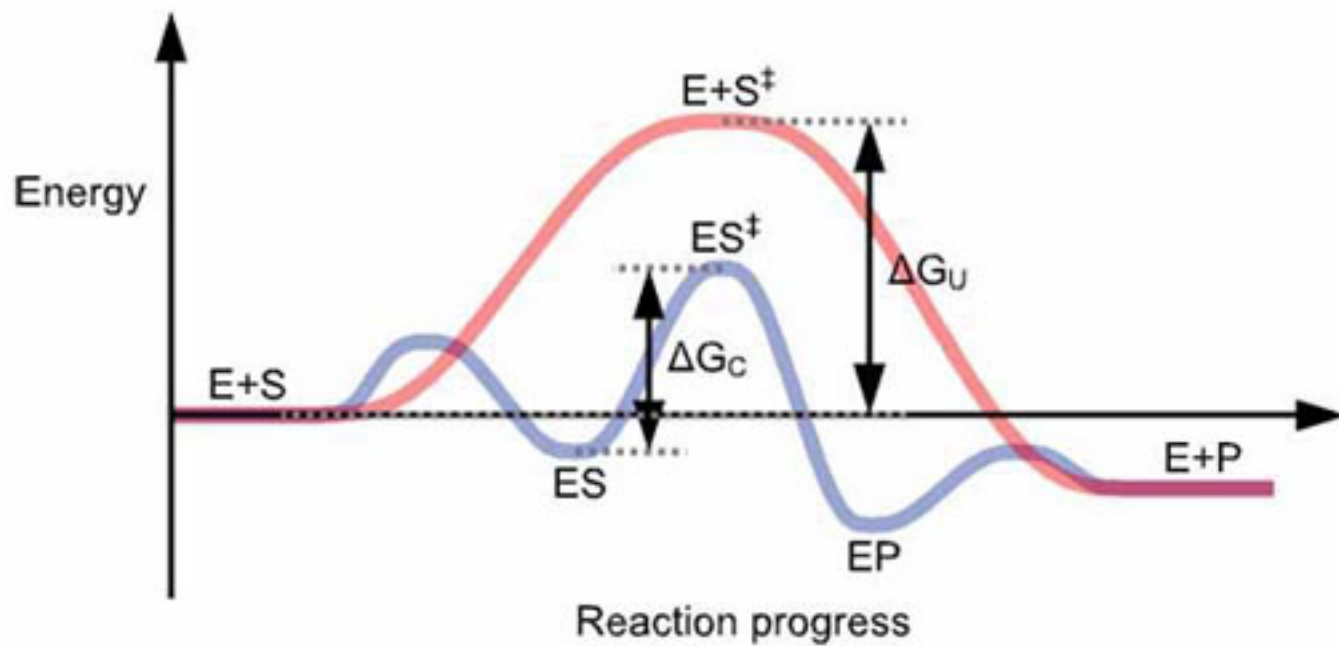
Enzyme Activity

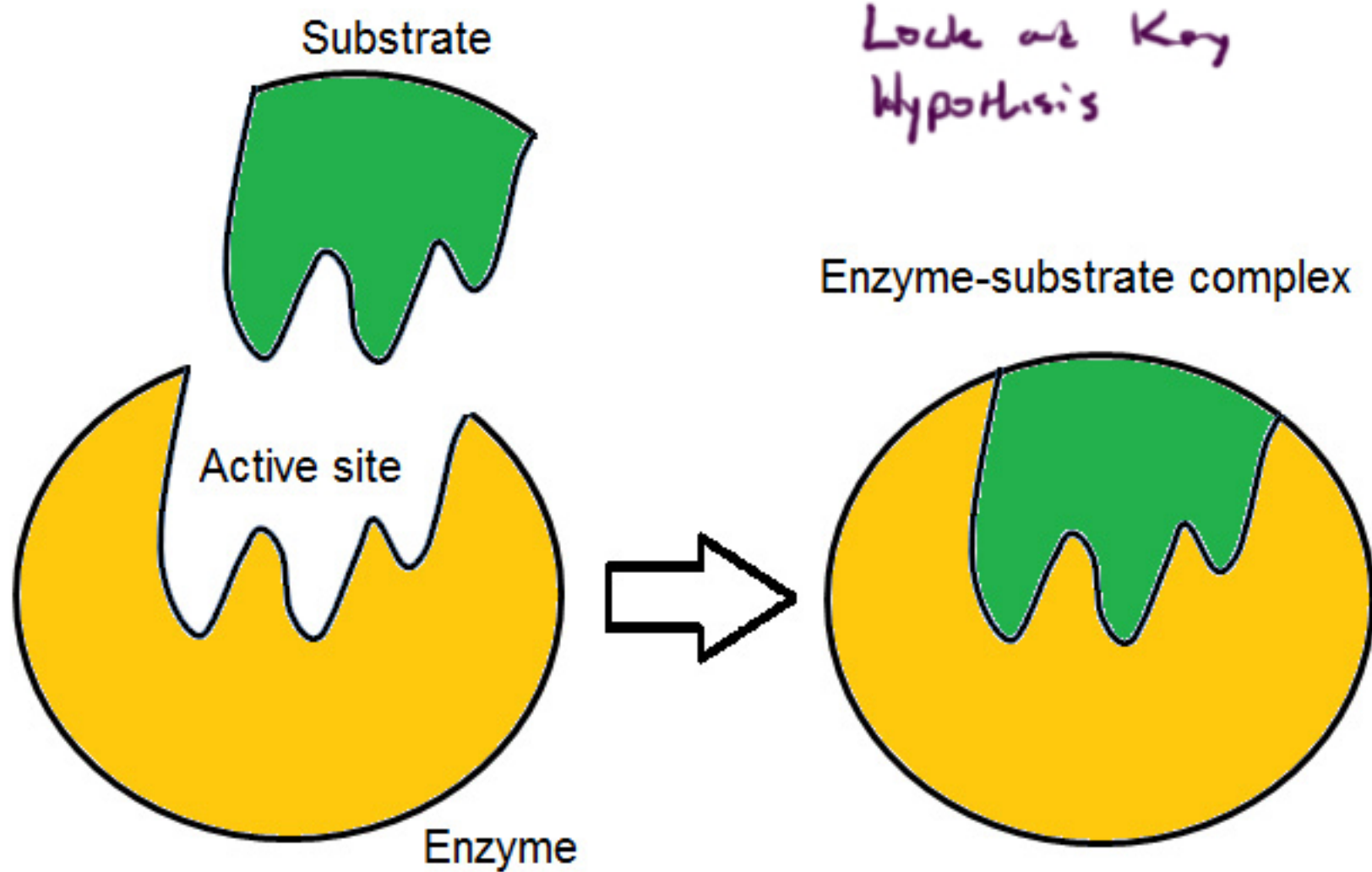
Session Slides with Notes

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Enzyme Activity





Substrate

Lock and Key Hypothesis

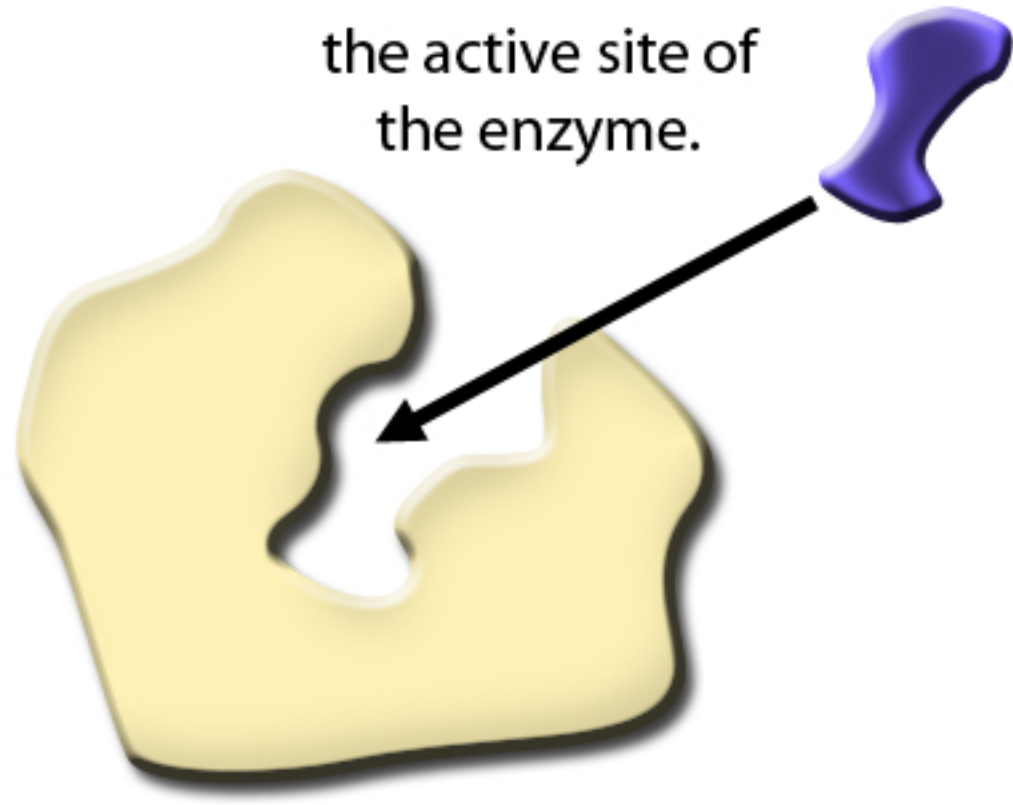
Enzyme-substrate complex

Active site

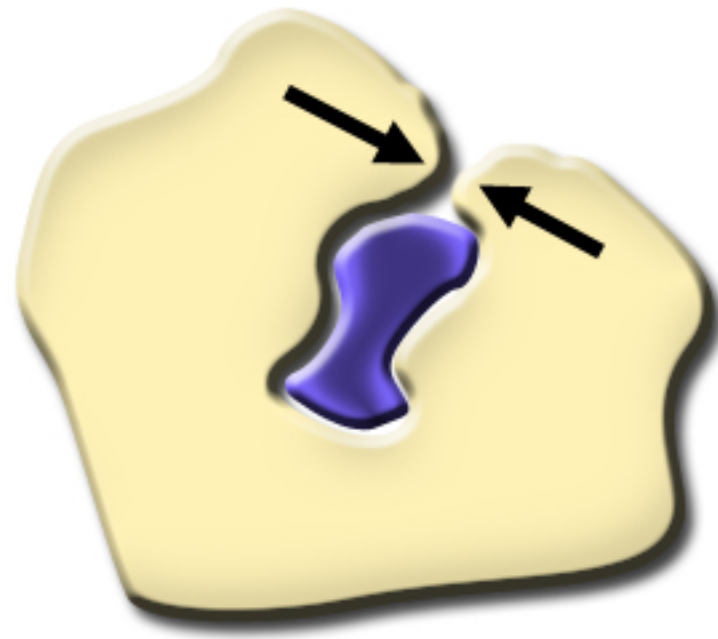
Enzyme

Induced Fit

The substrate enters the active site of the enzyme.

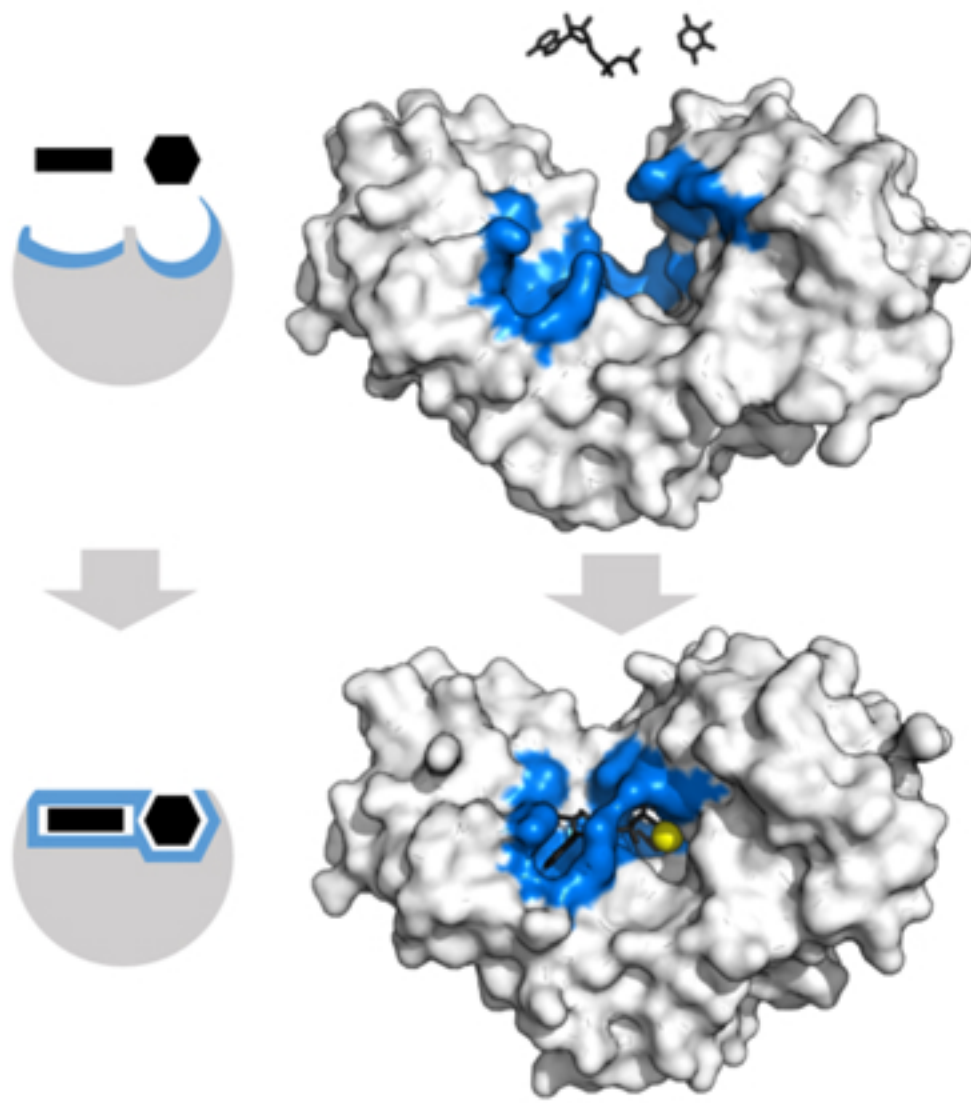


The enzyme clamps down around the substrate, forming an induced fit.

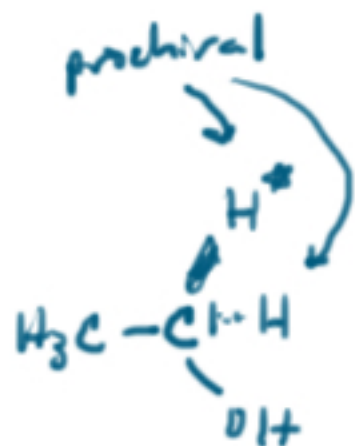
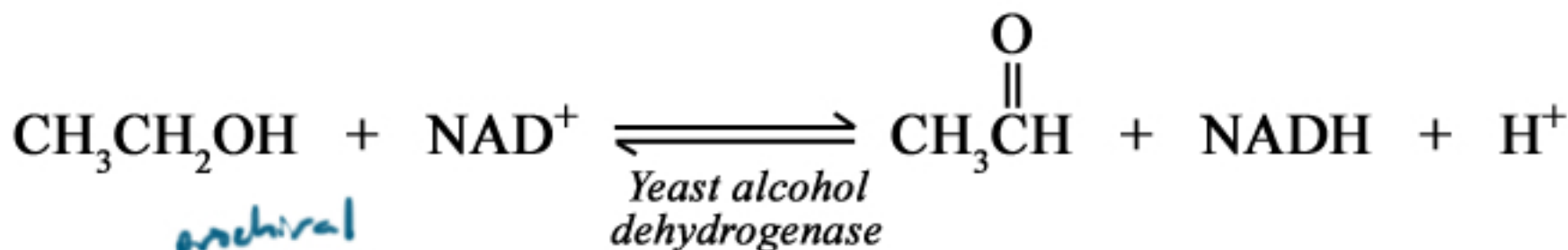


not only binding but also turnover

Induced fit
in Hexokinase



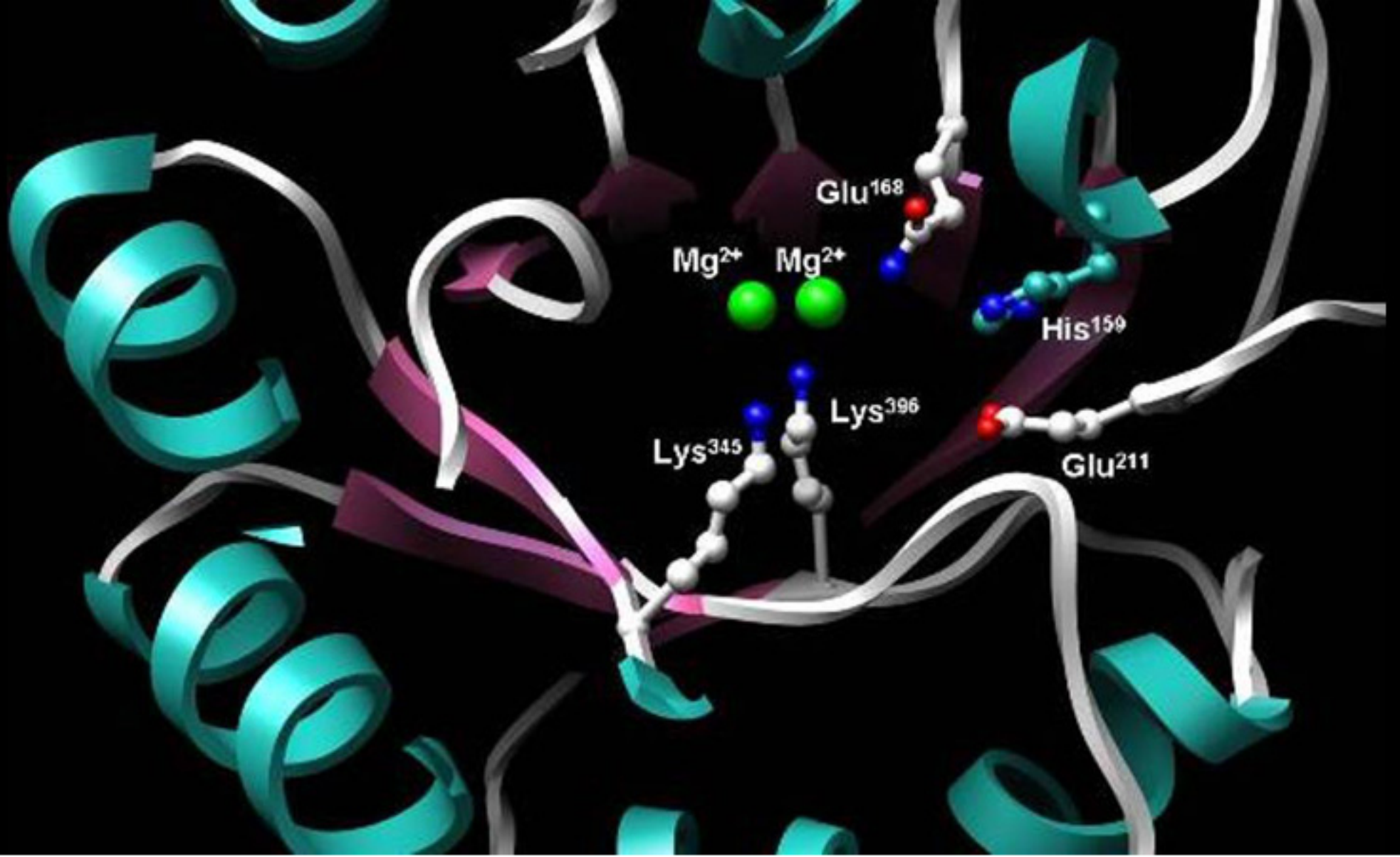
Enzymes may distinguish prochiral substituents.



← IF one H were ^2H (deuterium) is it possible that the NADH produced is all NADH^* or must it be 50:50?

on the benchtop the two H's would be equivalent.

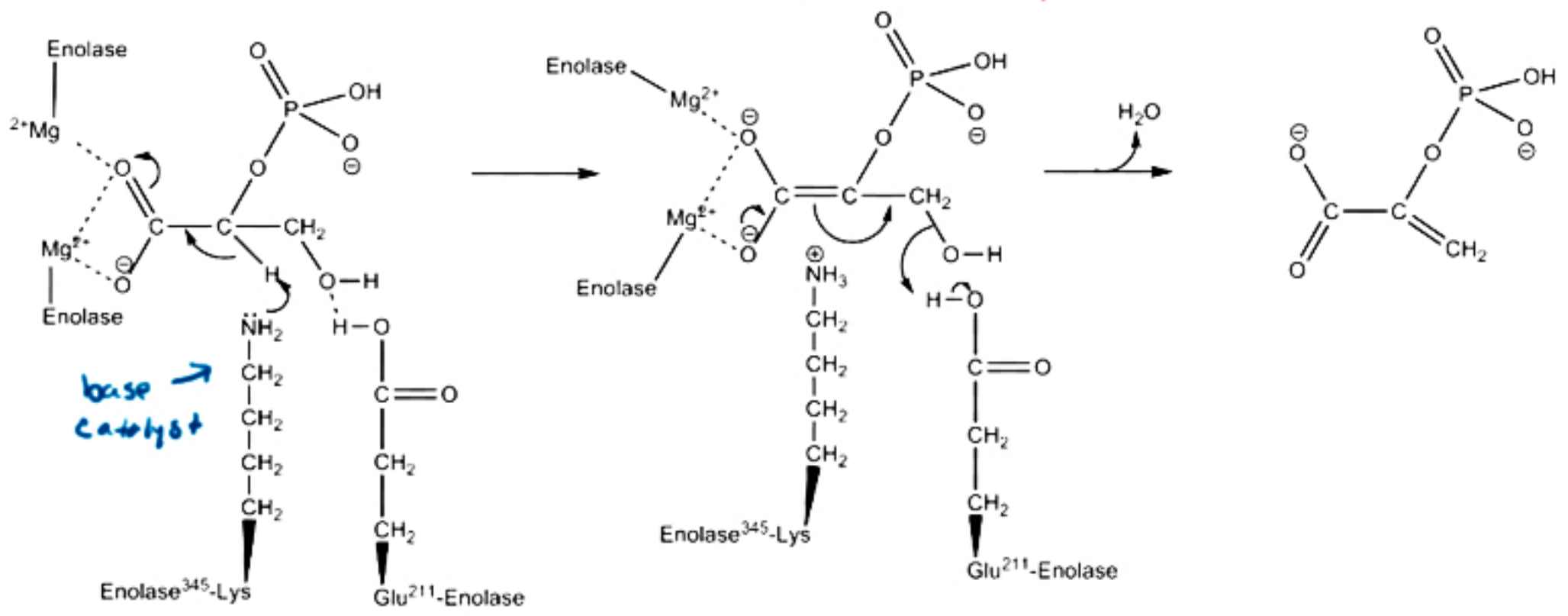
But an enzyme can distinguish prochiral substituents.

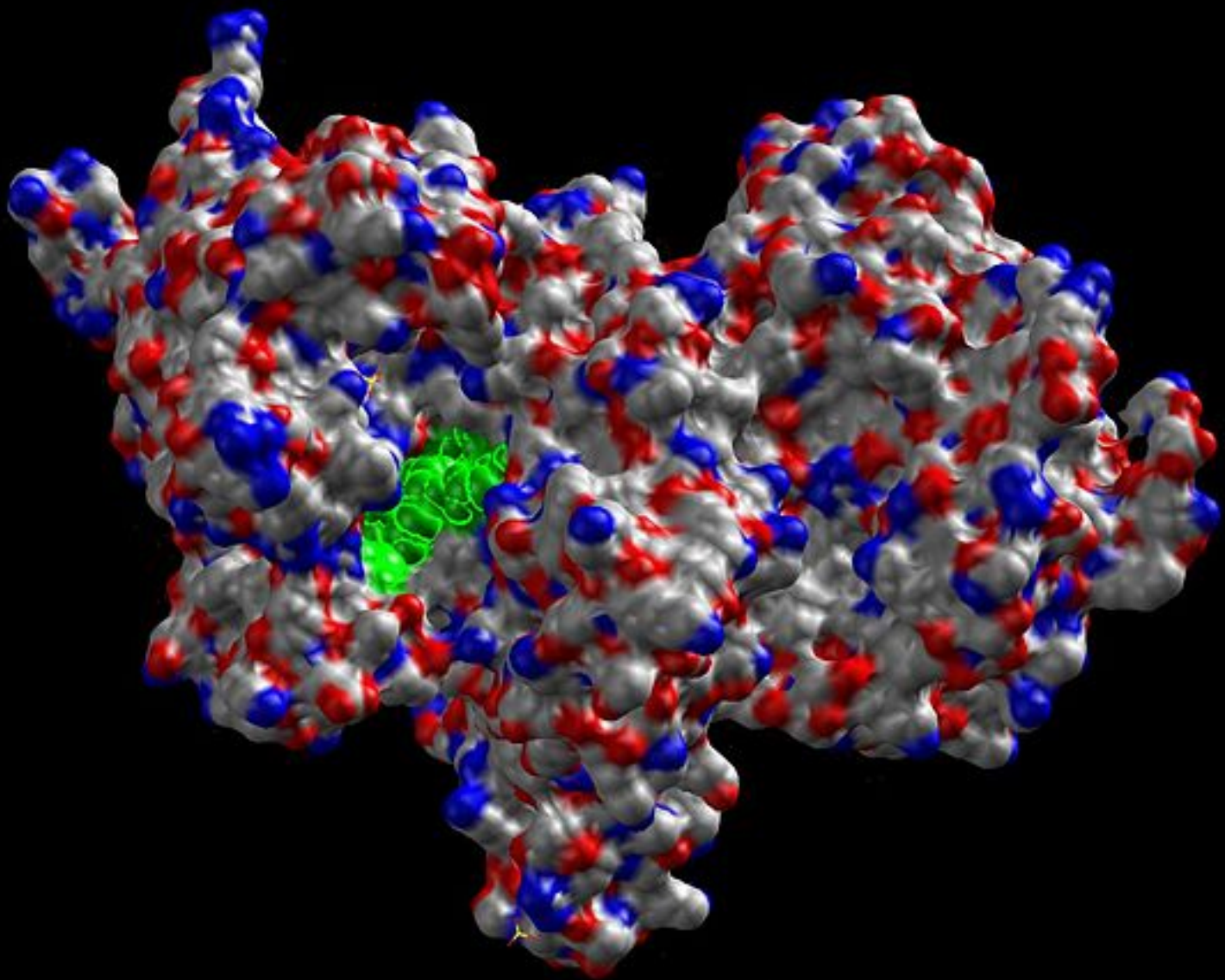


Enolase:

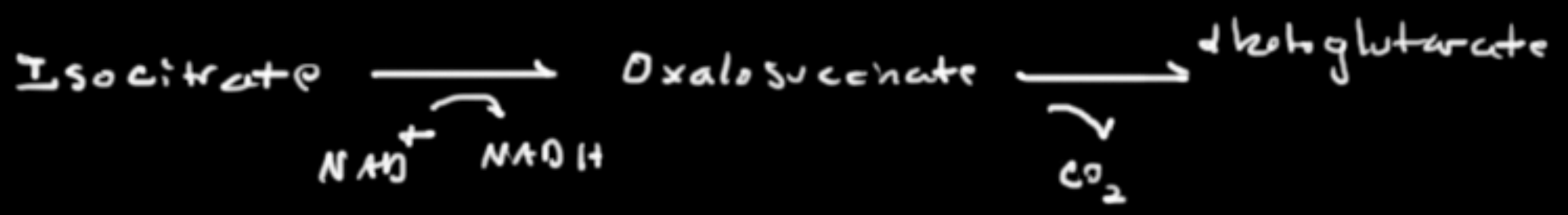
2-phosphoglycerate \longrightarrow phosphoenolpyruvate

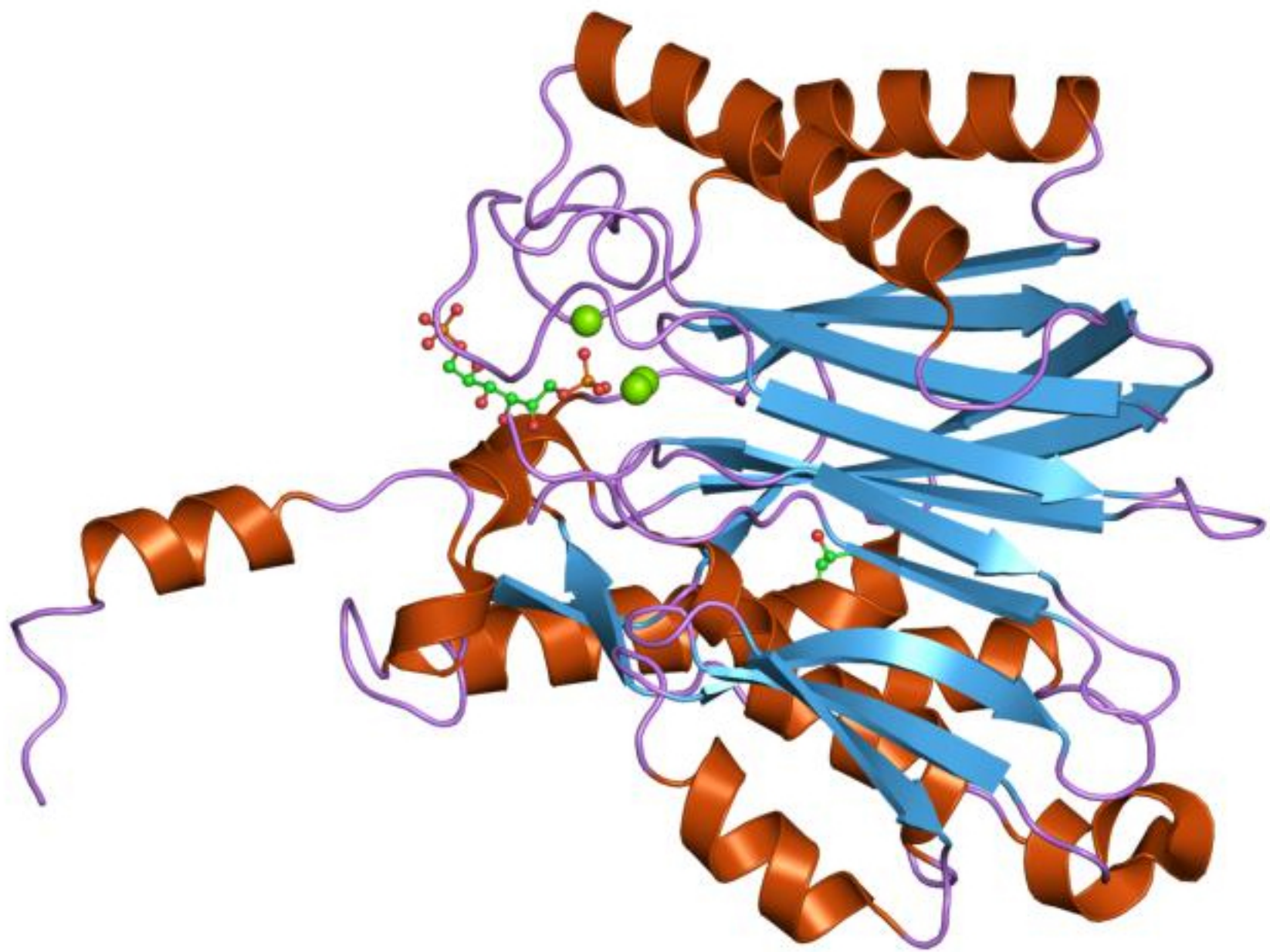
Enolase Mechanism





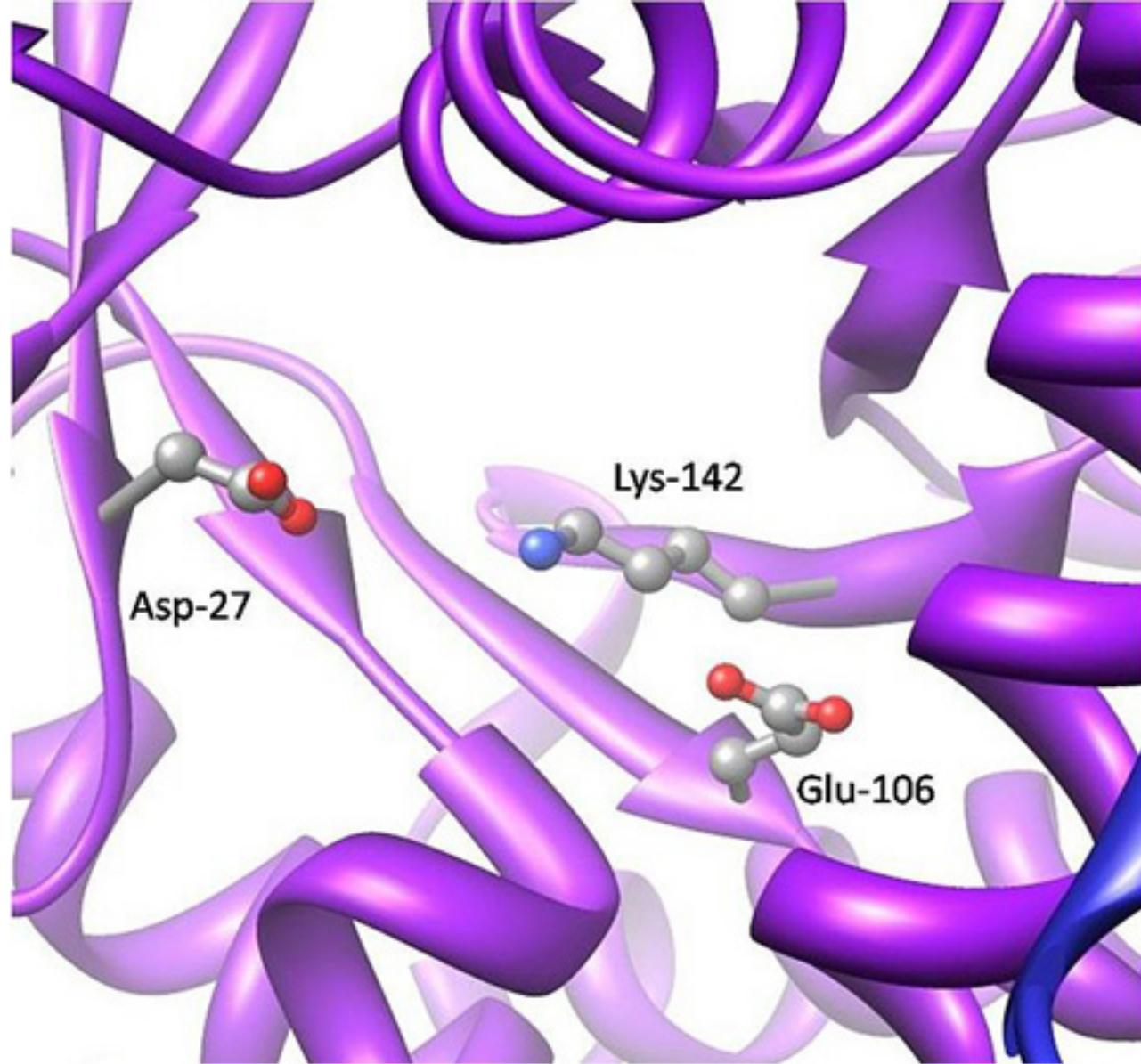
Isocitrate Dehydrogenase





Fructose 1,6 Bis phosphatase

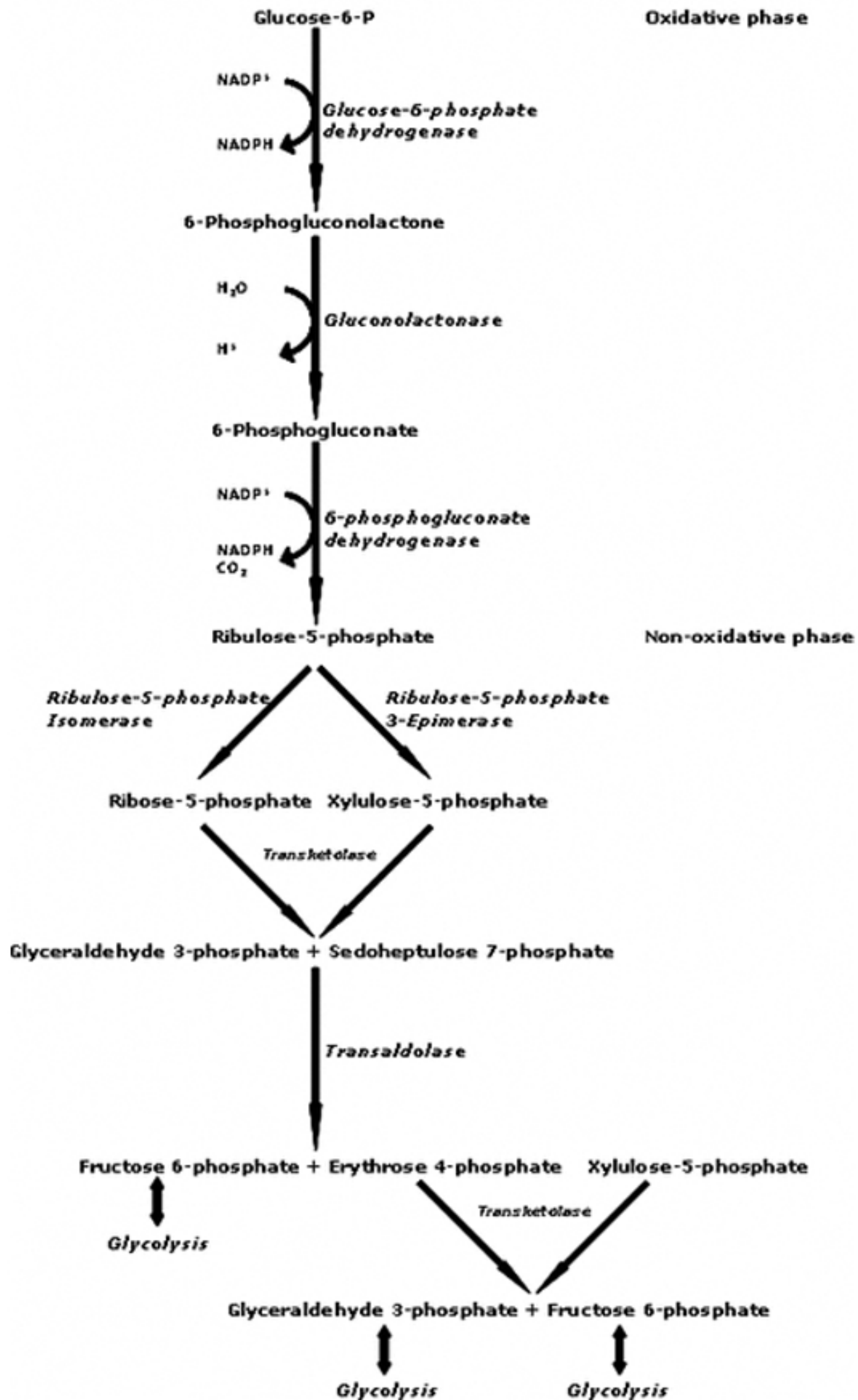


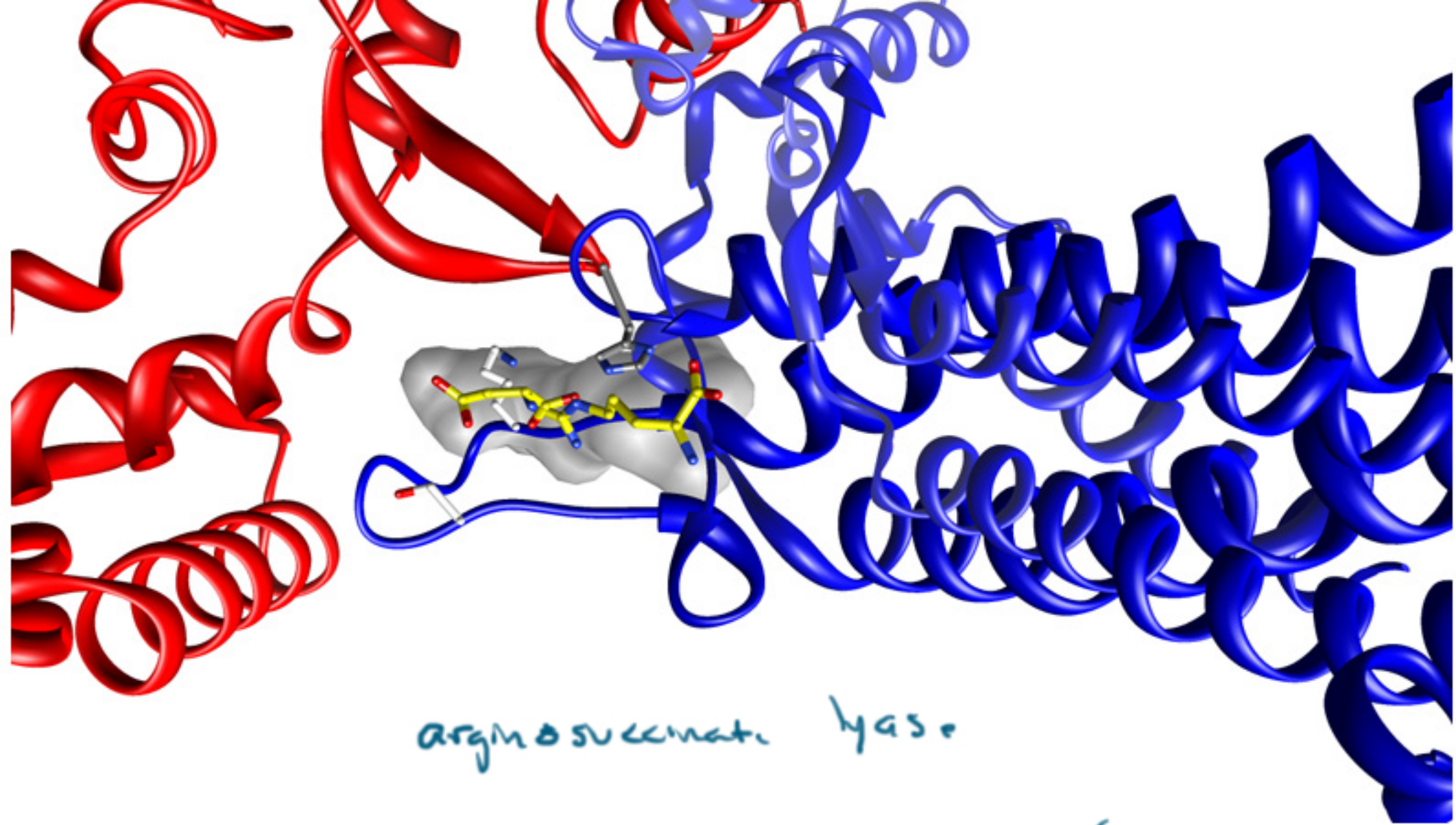


Transaldolase



Pentose Phosphate pathway



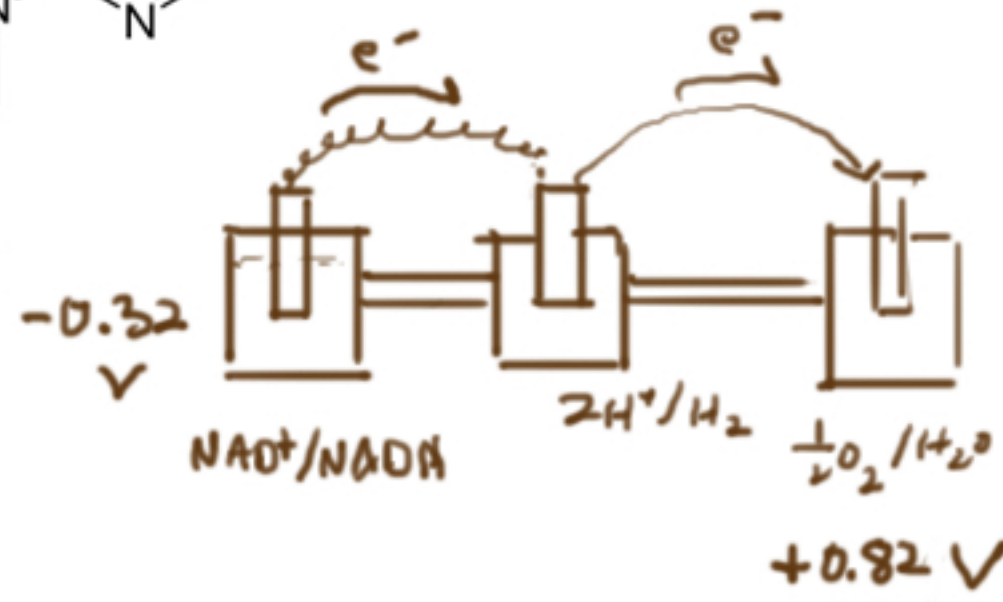
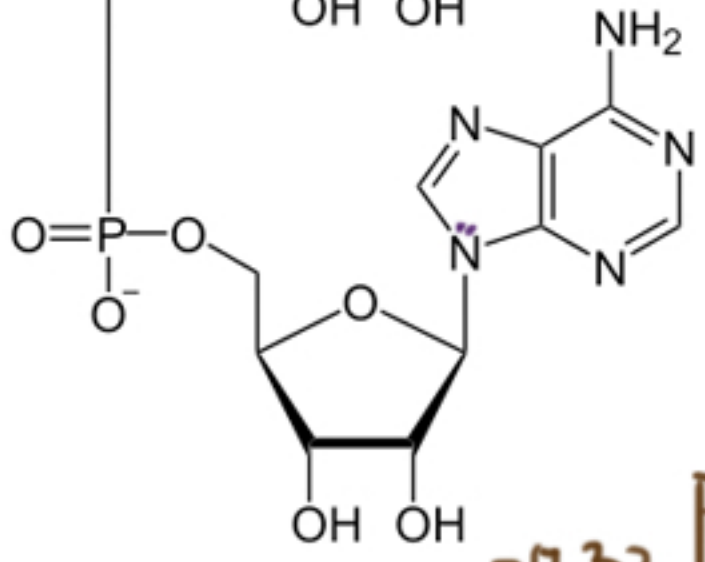
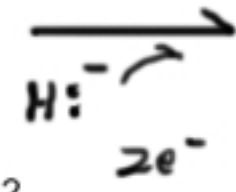
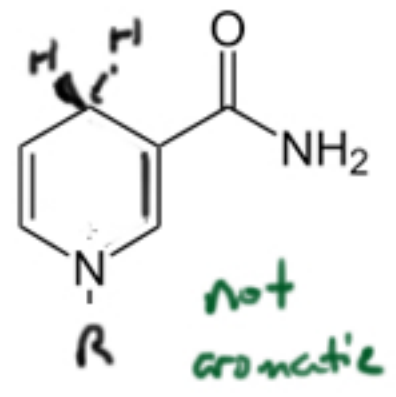
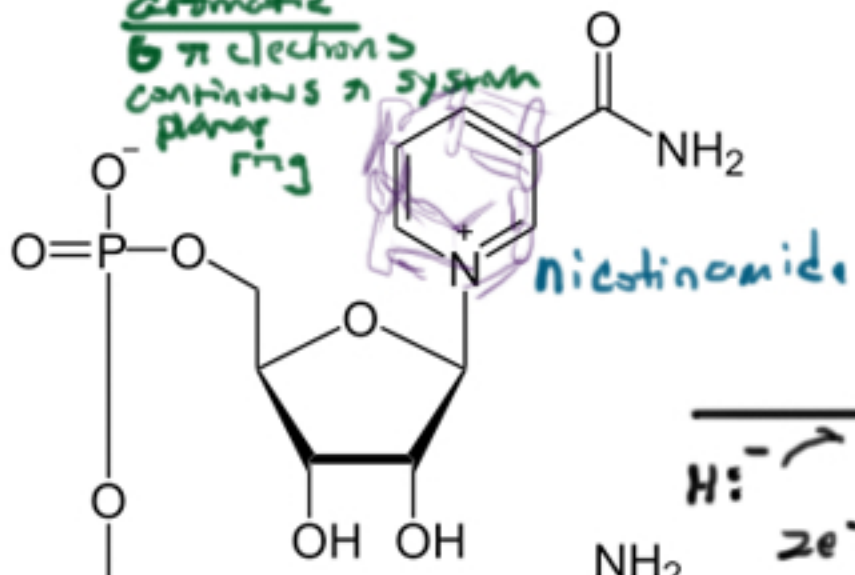


arginosuccinate lyase



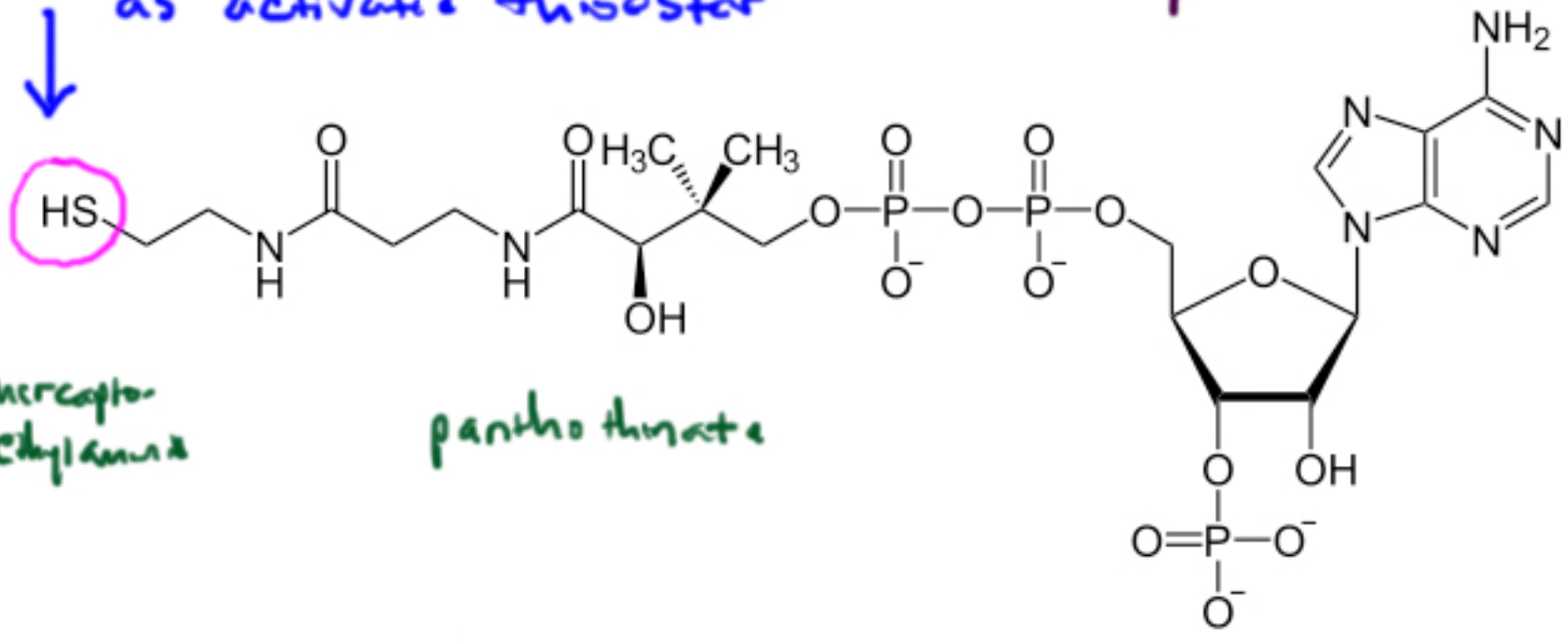
NAD^+

aromatic
6 π electrons
contains a system
p-orb ring



carries acyl groups here
as activated thioester

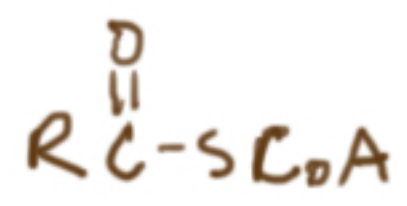
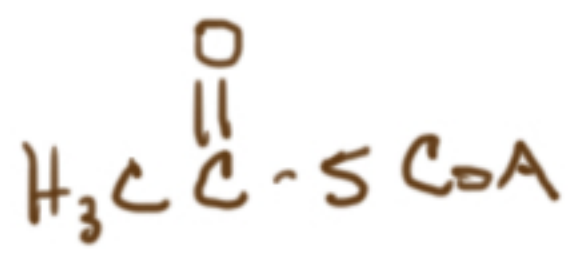
Coenzyme A



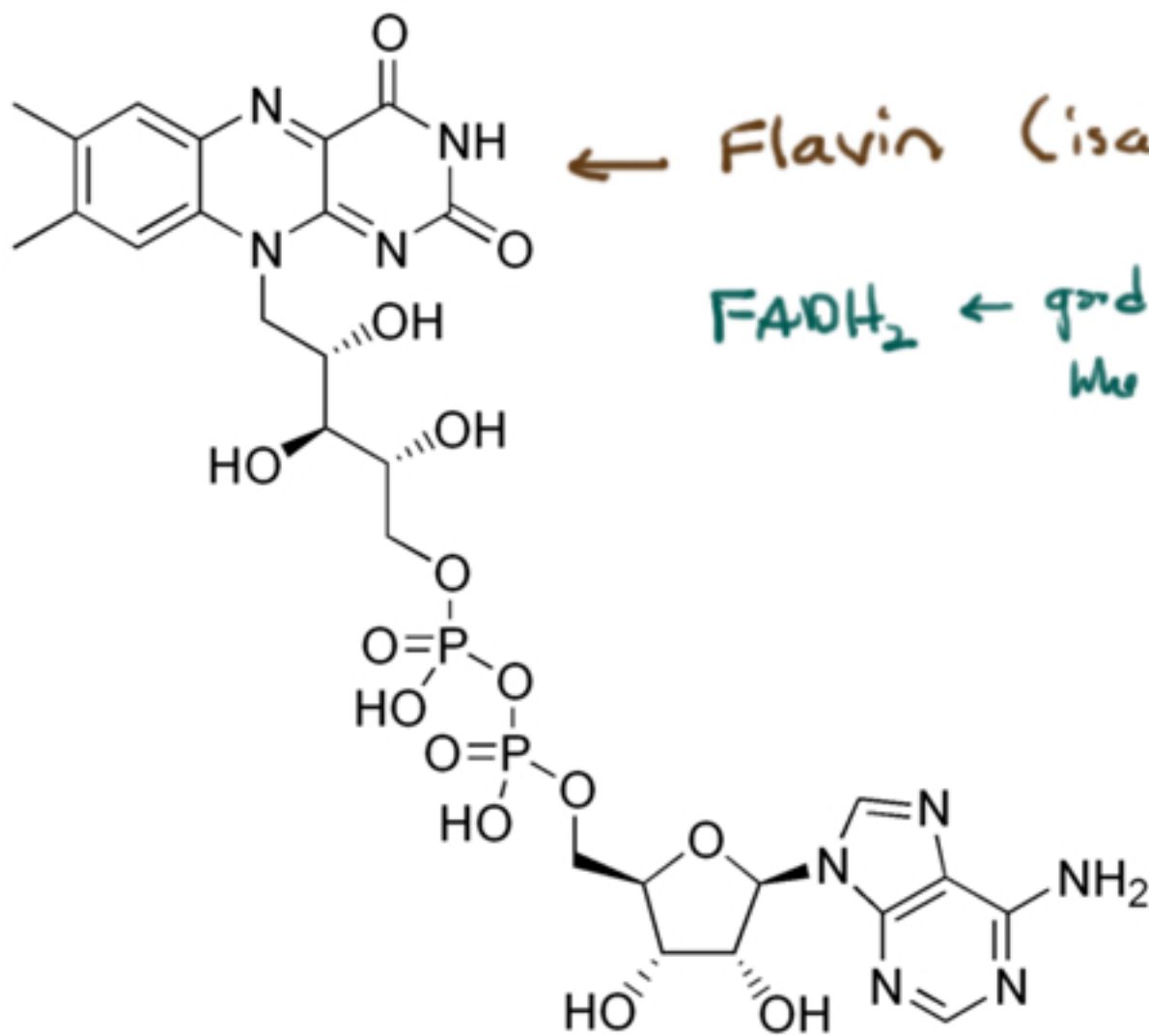
mercapto-ethylamine

pantoic acid

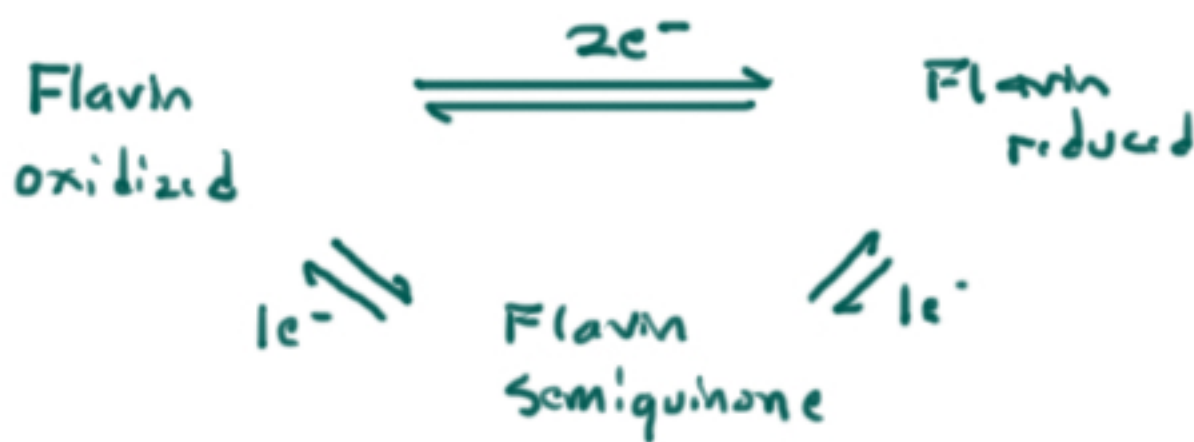
adenosine

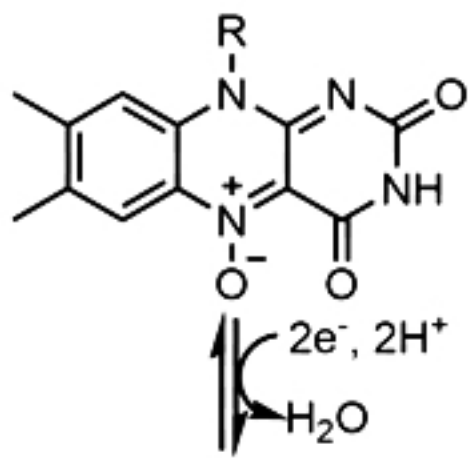


FAD

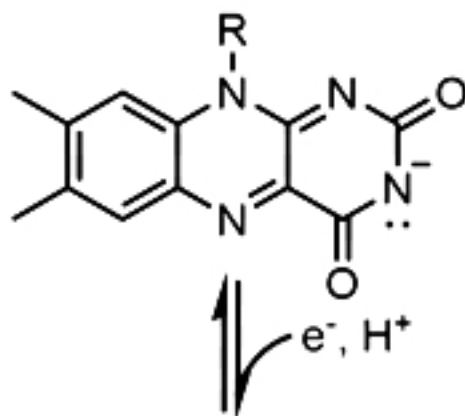
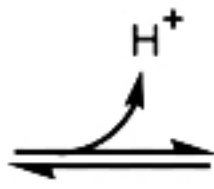
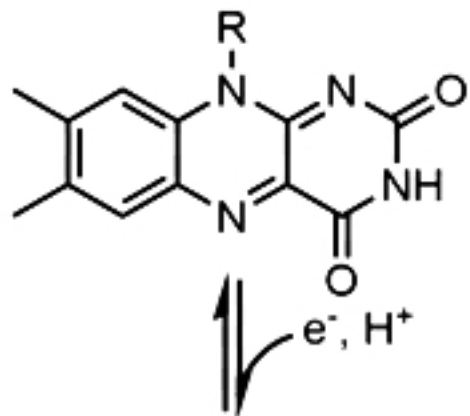
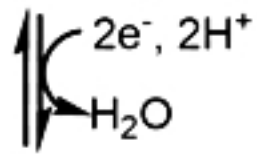


FADH₂ ← good electron carrier
like NADH

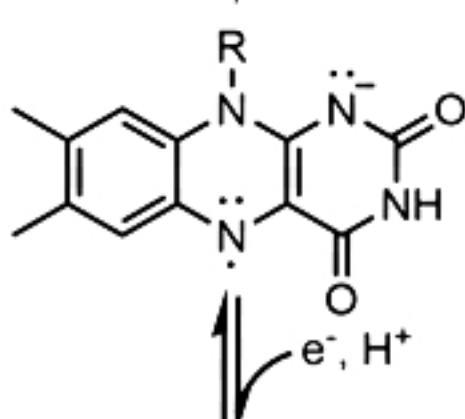
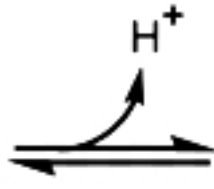
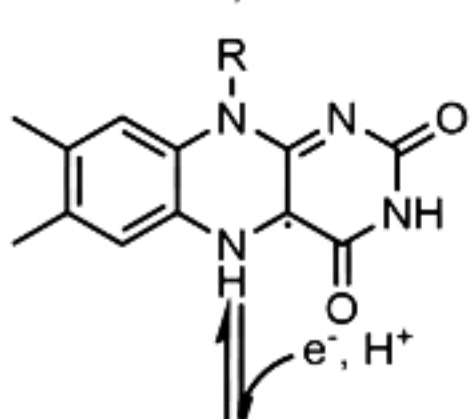




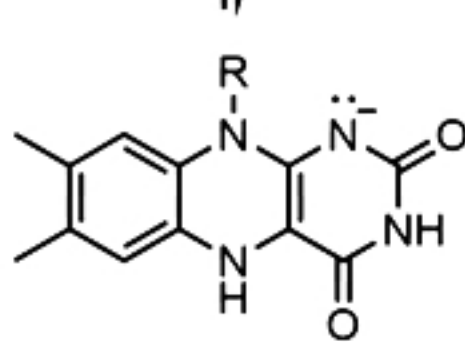
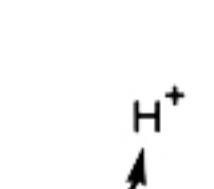
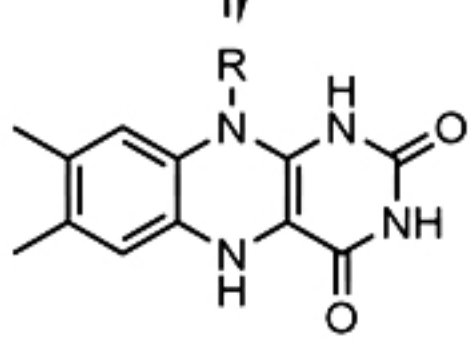
flavin-N(5)-oxide



quinone

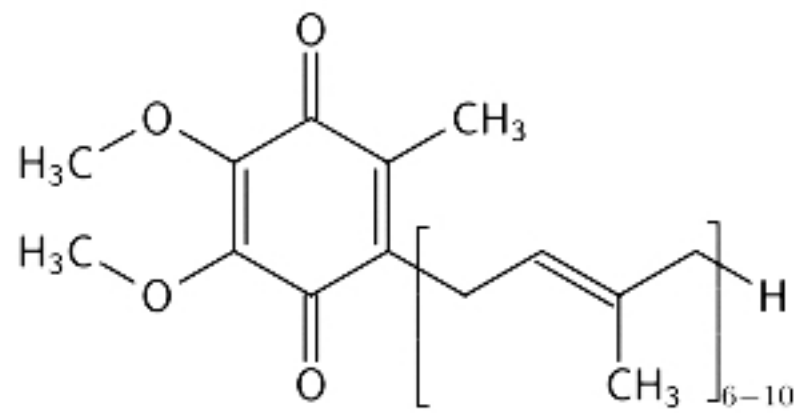


semiquinone



hydroquinone

Ubiquinone - CoQ



isoprene
unit

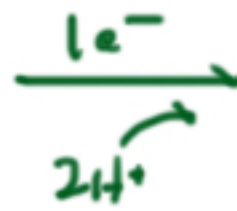


Benzquinone

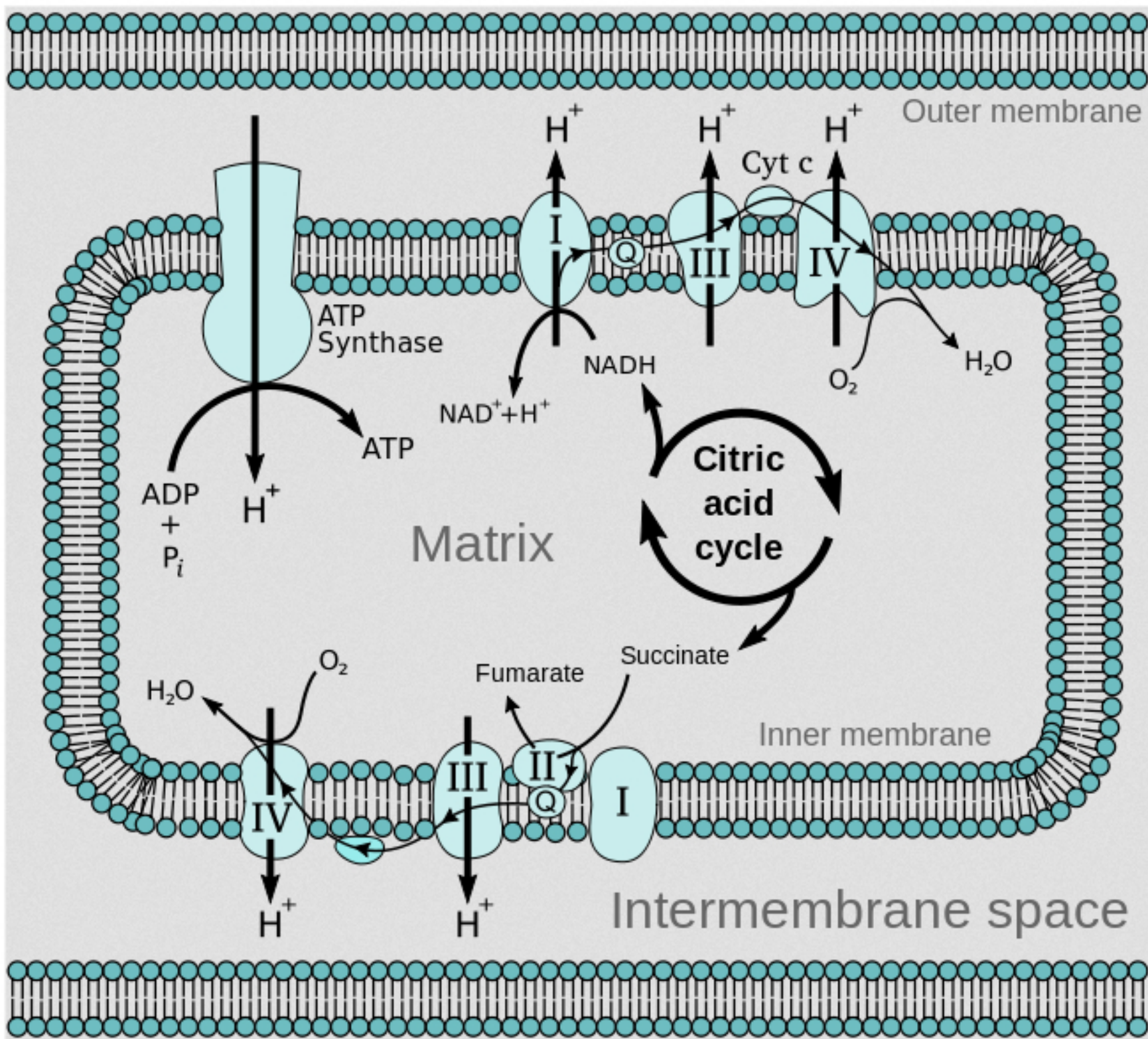


Semiquinone

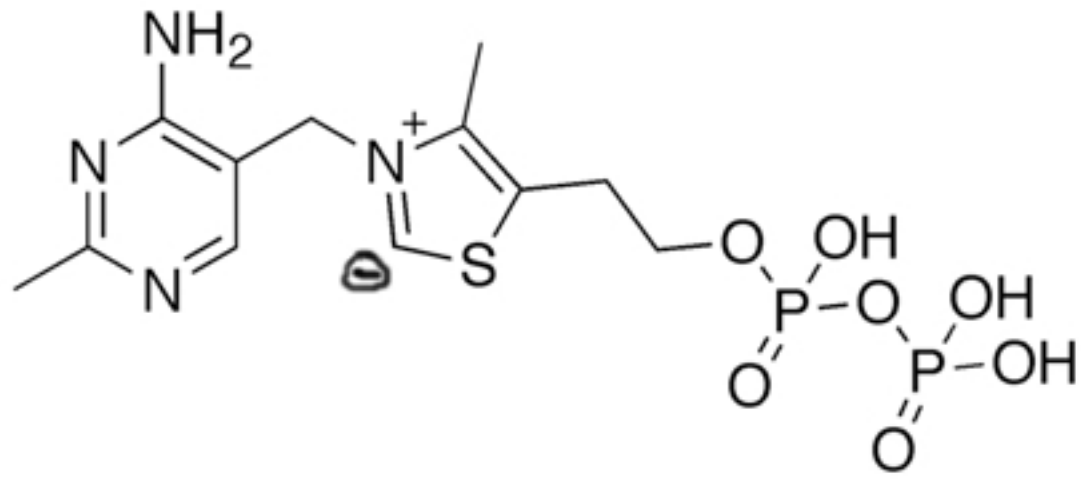
stable radical



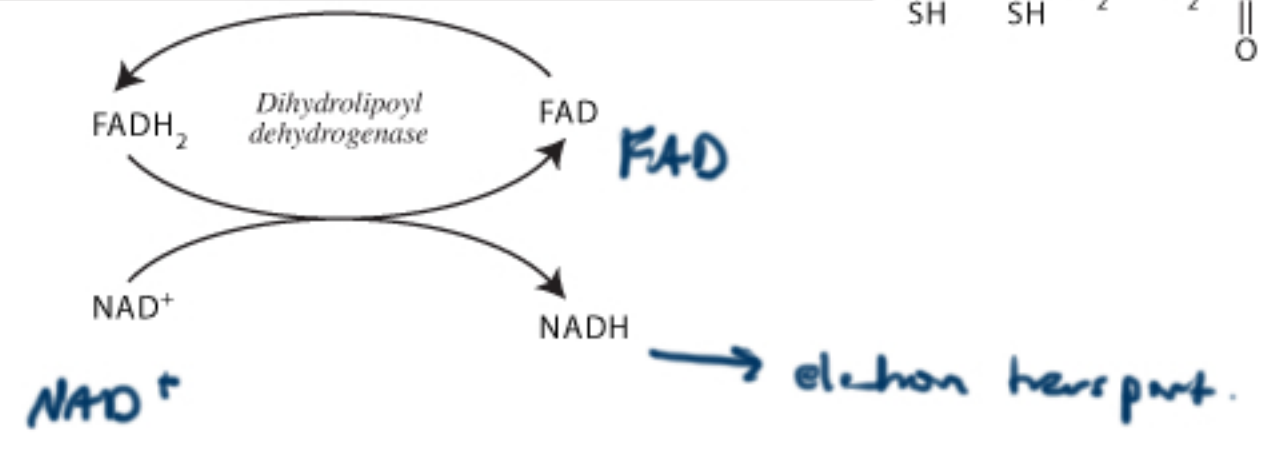
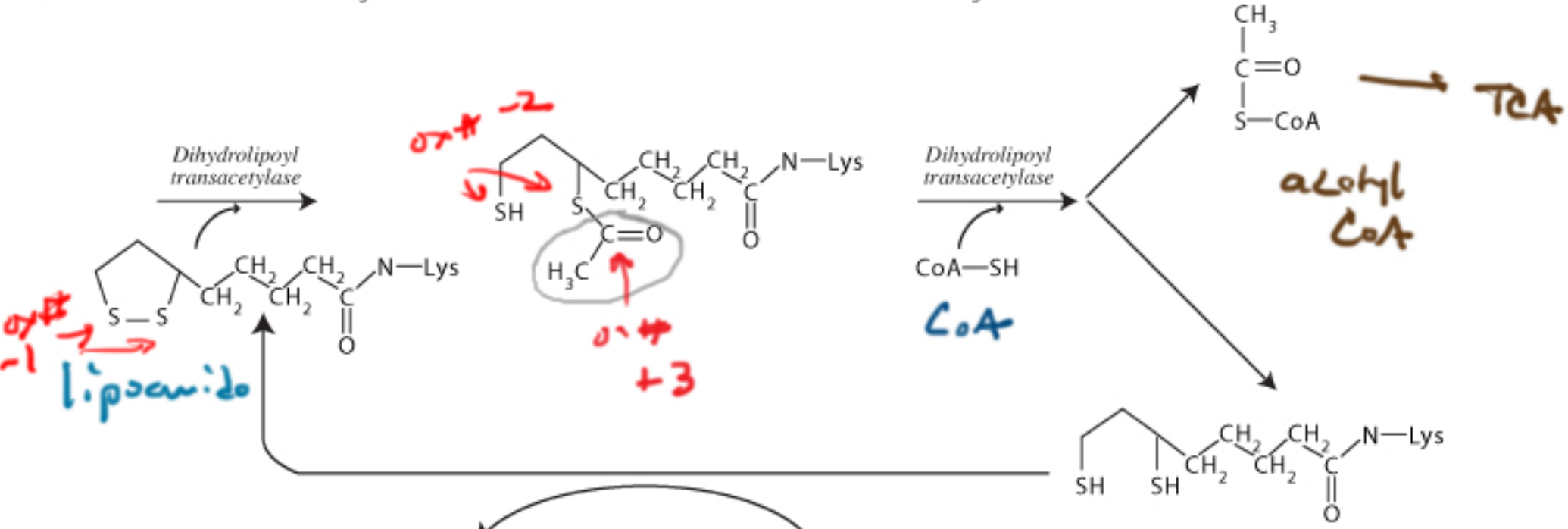
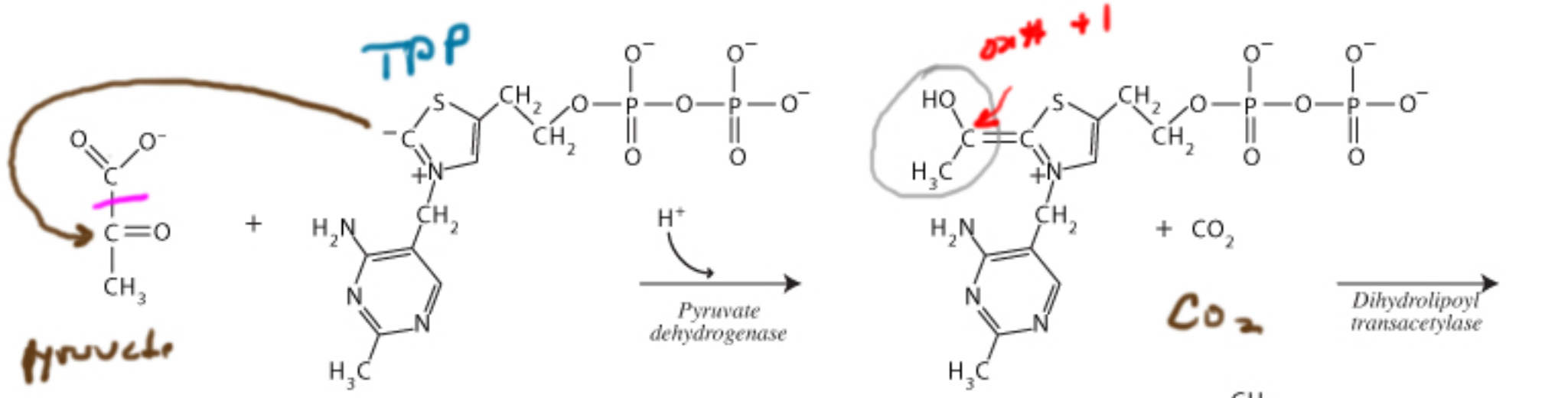
Quinol



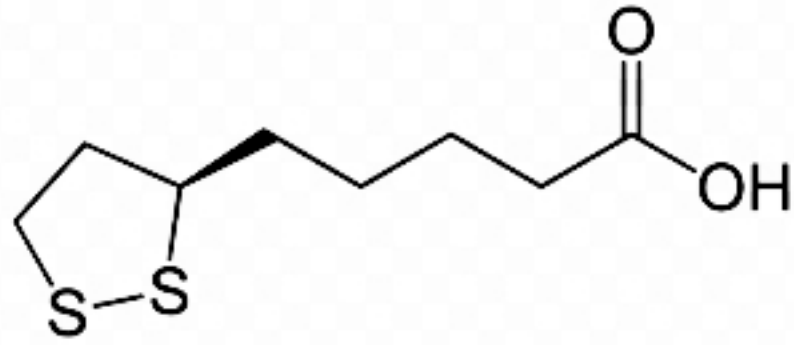
TPP - Thiamine Pyrophosphate



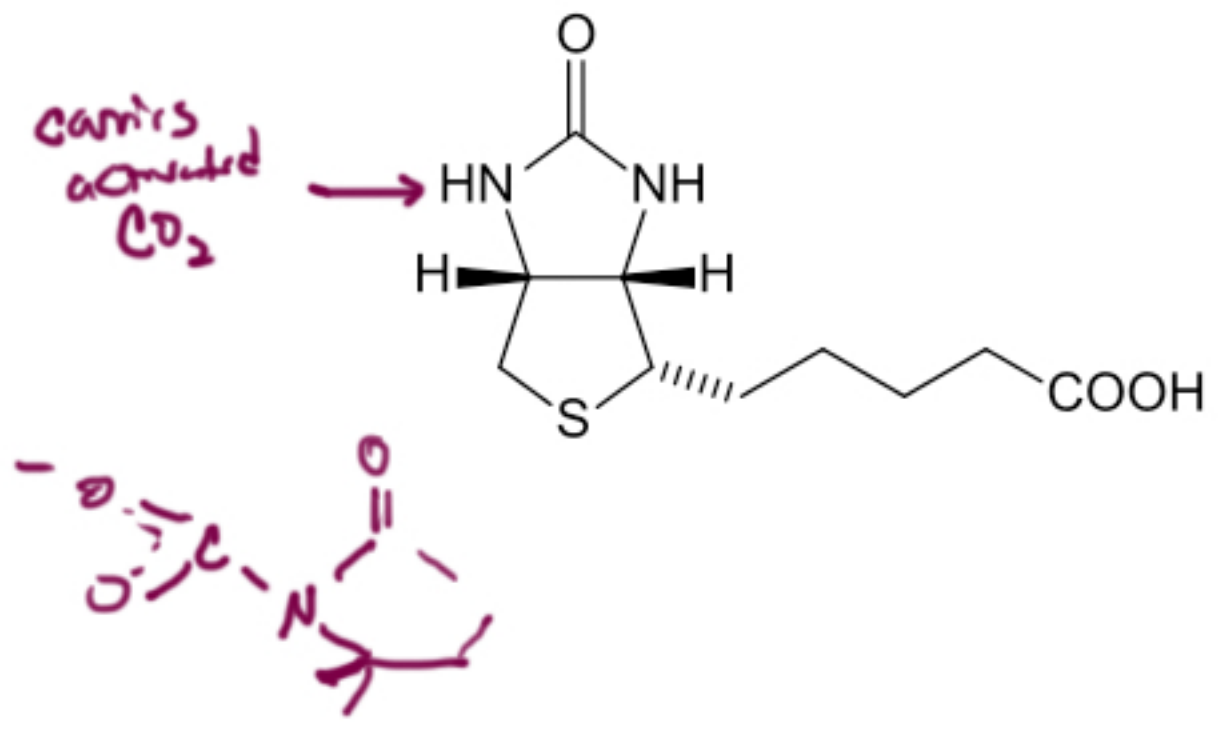
- pyruvate dehydrogenase
- α ketoglutarate dehydrogenase
- transketolase



Lipoic Acid



Biotin

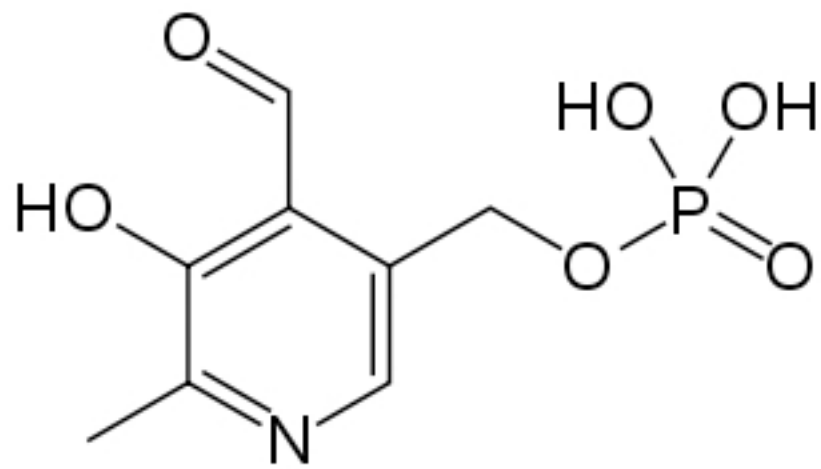


Best top application

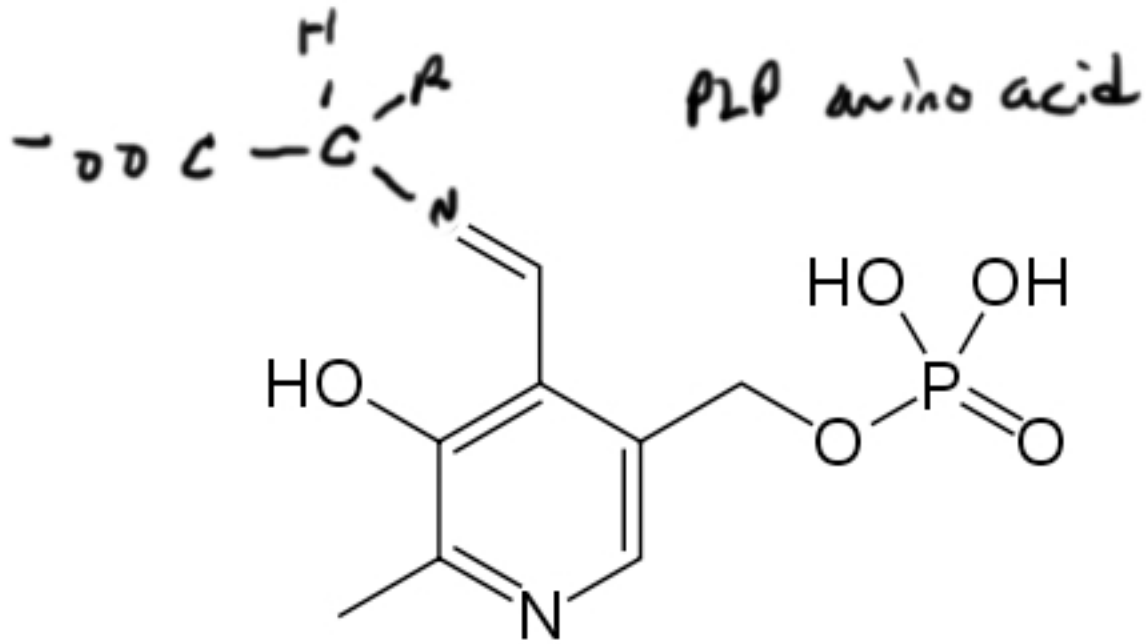
Biotinylation

- adding biotin for binding to avidin in affinity chromatography

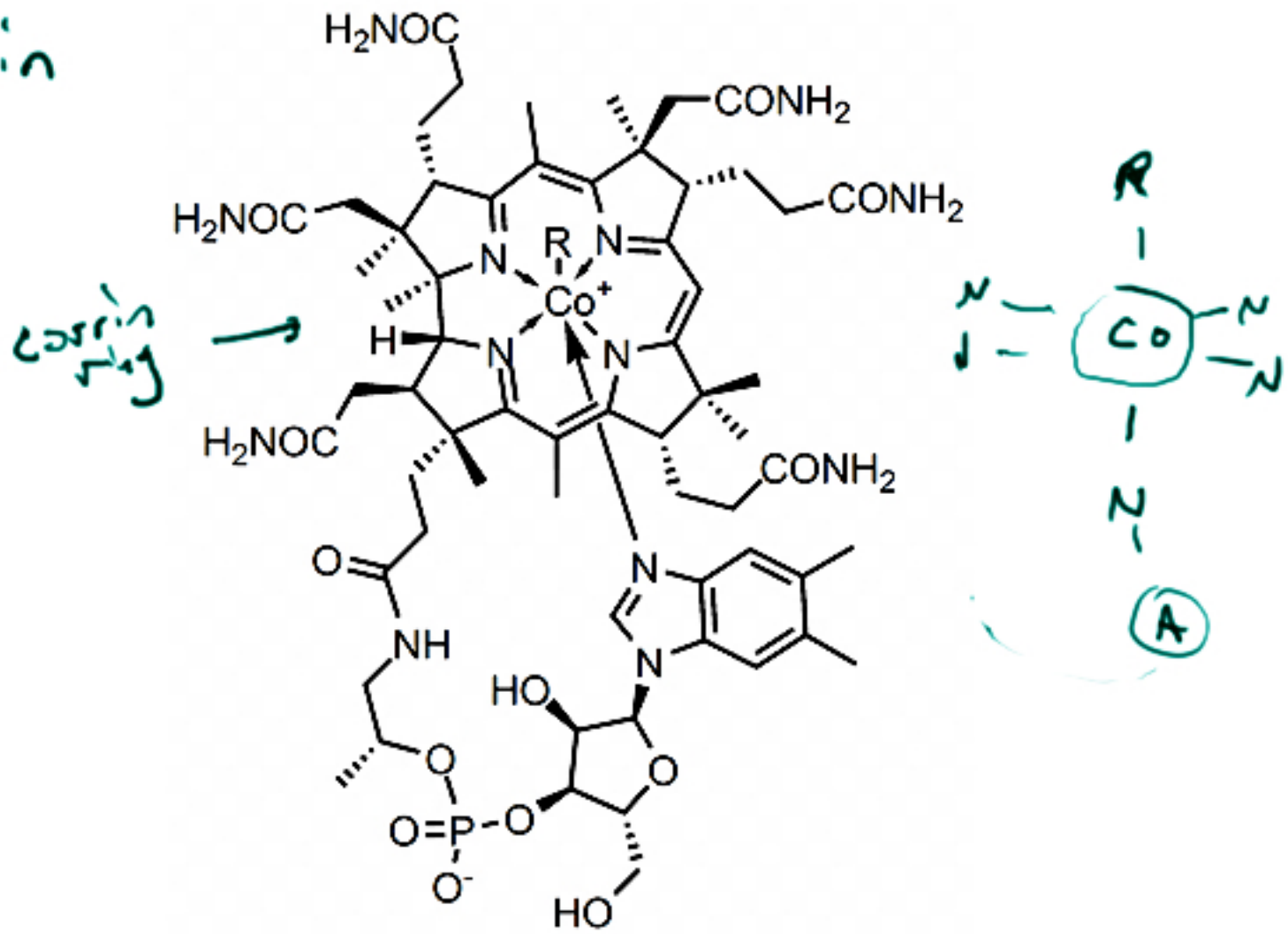
PLP



"the amino acid chemistry coenzyme"

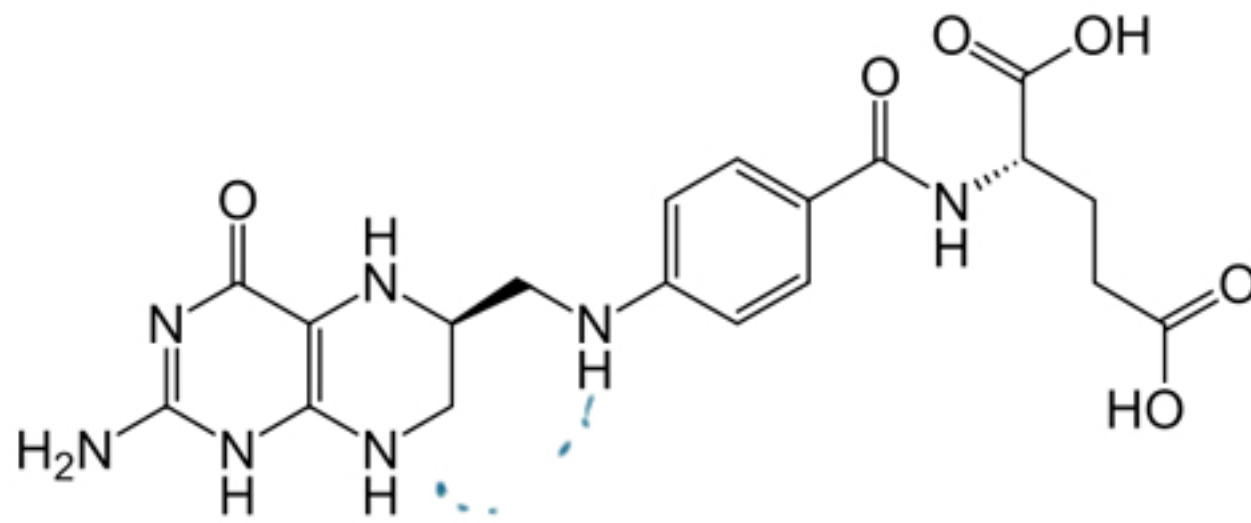


cobalamin



R = 5'-deoxyadenosyl, Me, OH, CN

Folate



donor of single carbon
units (methyl, formyl -
a variety of types).