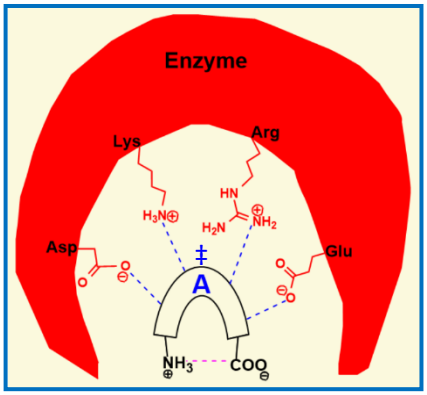
CONCEPT: ELECTROSTATIC & METAL ION CATALYSIS

2) Electrostatic Catalysis

●Enzyme *directly* stabilizes charges in the transition state (‡) by forming _____, *noncovalent* interactions.

□ Specific amino acids positioned in the active site _____ form electrostatic bonds with the ‡.

EXAMPLE: Electrostatic Catalysis.

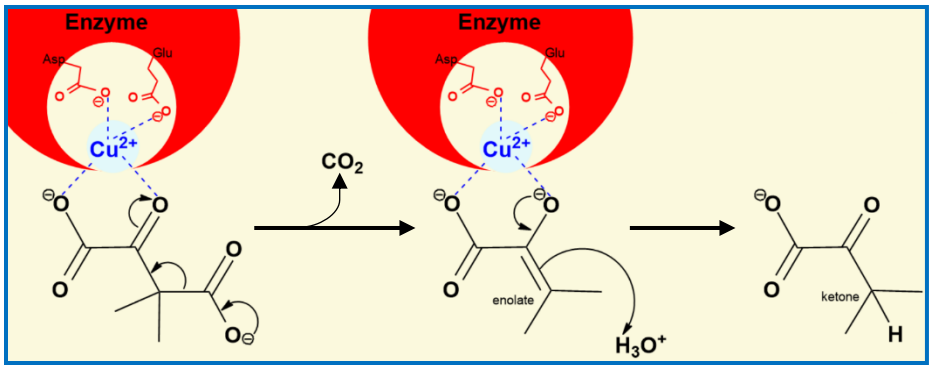


3) Metal Ion Catalysis

●*Metal Ion Catalysis*: enzyme *indirectly* forms *electrostatic* bonds with ‡ via its _____ ion cofactors.

□ Interactions between metals & substrates can _____ the substrate and/or _____ the ‡.

EXAMPLE: Decarboxylation via Metal Ion Catalysis.



PRACTICE: Catalysis by the enzyme urease is inhibited in the presence of Hg, Cd, or Co ions. What could this information potentially suggest about the catalytic mechanism of urease?

a) Urease uses acid-base catalysis.
b) Urease uses covalent catalysis.
c) Urease uses noncovalent catalysis.
d) Urease uses metal ion catalysis.

CONCEPT: ELECTROSTATIC & METAL ION CATALYSIS

PRACTICE: Which of the following best applies to metal ion catalysis?

a) A covalent bond forms between enzyme and substrate.

b) Catalyst may participate in oxidation-reduction reactions by changes in the oxidation state.

c) May use amino acids such as aspartate or lysine for protonation or proton abstraction.

d) Uses nucleophilic functional groups.

e) Lowers the energy of the transition state.

f) a & d.

g) b & e.