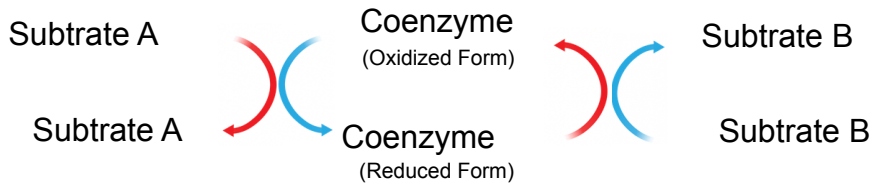
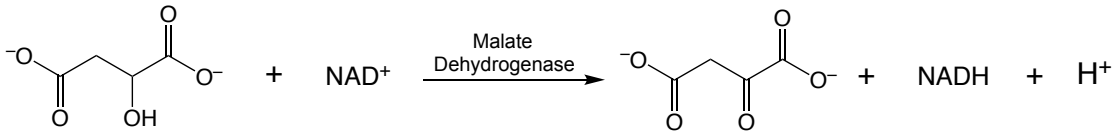
CONEPT: COENZYMES IN METABOLISM

- The driving force of catabolism is the oxidation of molecules in order to _____ energy.
  - □ This is accomplished by coenzymes cycling between their _____ and _____ forms.
  - □ The reduced forms act as electron carriers that carry energy that is ultimately passed to bonds of ATP.

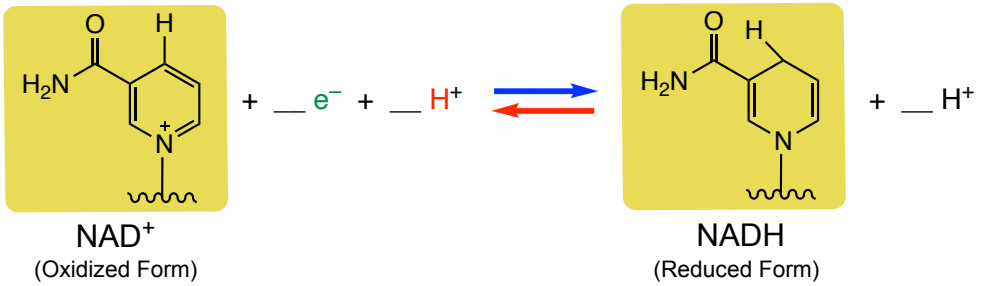


EXAMPLE: Consider the reaction given below and correctly identify the oxidizing agent.

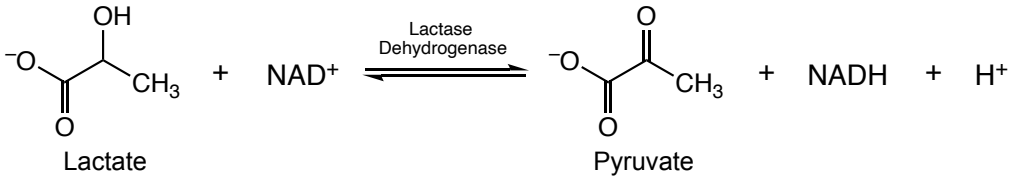


Nicotinamide Adenine Dinucleotide

- The nicotinamide group of NAD^+ is the site of reduction that is seeking to become _____.
  - □ The reduction occurs by accepting ___ electrons to gain ___ H^+.
  - □ **Result:** Reduction of NAD^+ to _____.



EXAMPLE: Which of the following correctly identifies the molecules in the given reaction?



a) Lactate = Reduced substrate, NAD^+ = oxidized cofactor, Pyruvate = Oxidized Substrate

b) Lactate = Reduced Enzyme, NAD^+ = reduced coenzyme, Pyruvate = Oxidized Enzyme

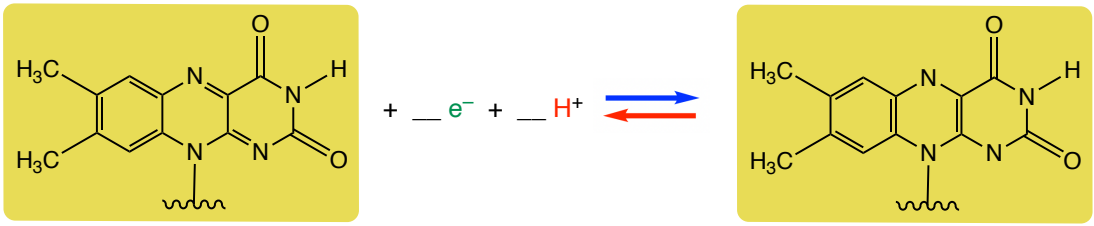
c) Lactate = Reduced substrate, NAD^+ = oxidized cofactor, Pyruvate = Oxidized Substrate

d) Lactate = Reduced substrate, NAD^+ = oxidized coenzyme, Pyruvate = Oxidized Substrate

CONCEPT: COENZYMES IN METABOLISM

Flavin Adenine Dinucleotide

- The flavin group of FAD is the site of reduction that has ___ hydrogen atoms added to its nitrogen atoms.
  - □ The reduction occurs by adding ___ electrons + ___ H^+ to form ___ new covalent bonds.
  - □ **Result:** Reduction of FAD to _____.



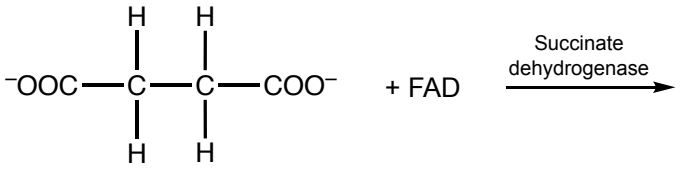
FAD

(Oxidized Form)

_____

(Reduced Form)

EXAMPLE: When FAD oxidizes the substrate, it converts C–C bonds to C=C bonds. Complete the following reaction.



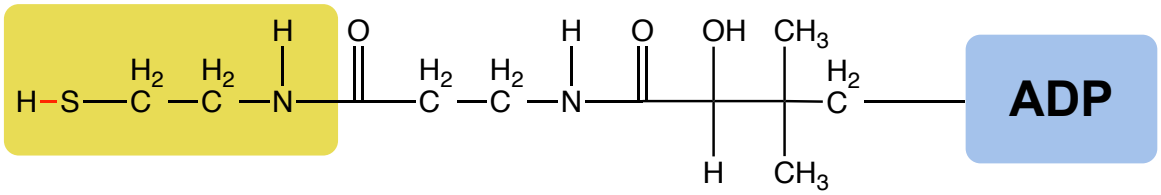
Succinate

Coenzyme A

- Coenzyme A is a coenzyme of synthase.
  - □ Has a high-energy _____ bond.
  - □ Carries an acetyl group to the Krebs cycle for energy production by oxidation.

Aminoethanethiol

Pantothenic acid (_____)



Coenzyme A

EXAMPLE: Which of the following statements correctly describes Coenzyme A? (Select all that apply).

a) When acetyl group is released from acetyl-S-CoA, it produces HS-CoA.

b) Vitamin B is present in the active site of CoA.

c) Primary role of CoA is to oxidize fatty acids.

d) CoA is composed of pantothenic acid (vit B5), aminoethanethiol, and ADP.

CONCEPT: COENZYMES IN METABOLISM

PRACTICE: Select the correct statement.

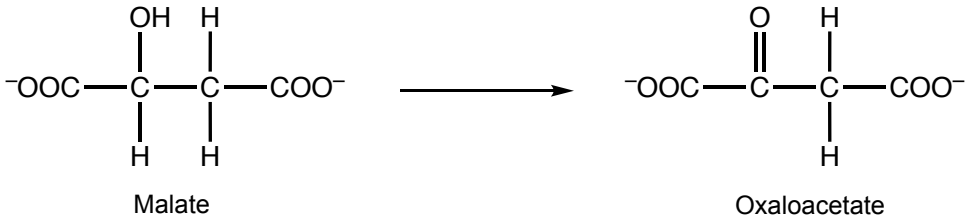
a) When FAD is reduced, it gains 2 hydrogen ions and 2 electrons, forming FADH.

b) NAD^+ represents an oxidized form of the coenzyme, and acts as an oxidizing agent.

c) FADH represents an oxidized form of the coenzyme, and acts as a reducing agent.

d) After CoA is oxidized, it forms Acetyl CoA.

PRACTICE: Is the following reaction an oxidation or reduction? Which coenzyme would be carrying this out, NAD^+ or NADH?



a) oxidation, NAD^+ b) oxidation, NADH c) reduction, NAD^+ d) reduction, NADH