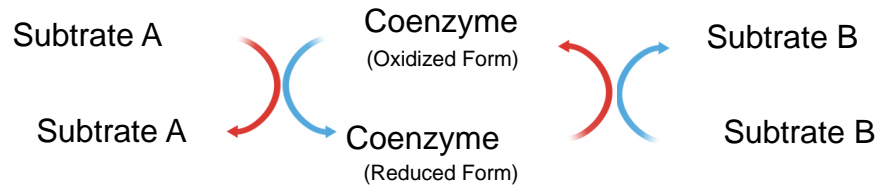
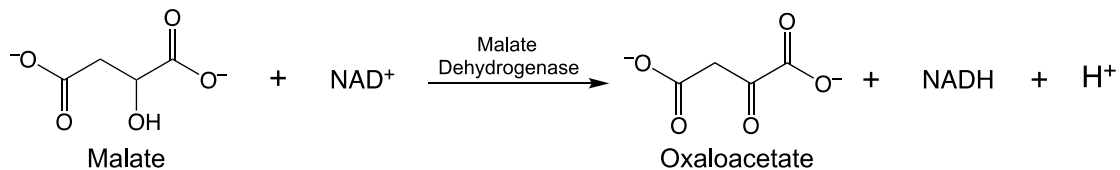


CONCEPT: COENZYMES IN METABOLISM

- 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.

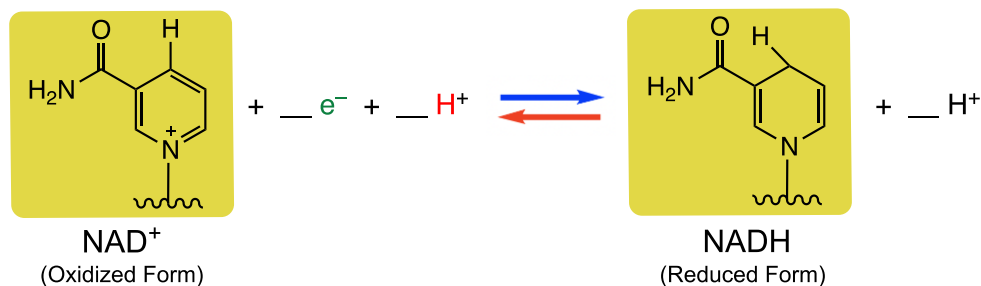


EXAMPLE: Consider the reaction given below and correctly identify the oxidizing agent.

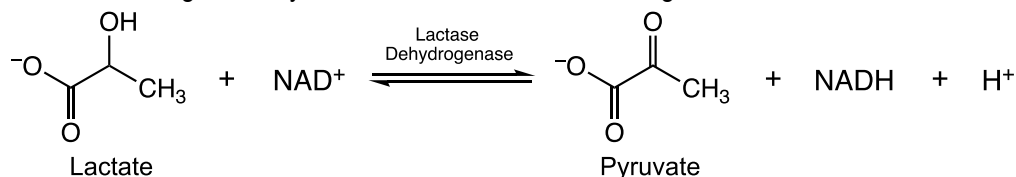


Nicotinamide Adenine Dinucleotide

- 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 _____.



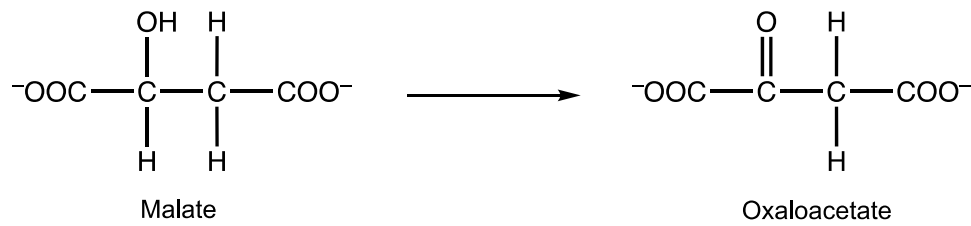
EXAMPLE: Which of the following correctly identifies the molecules in the given reaction?



- a) Lactate = Oxidized substrate, NAD⁺ = reduced coenzyme, Pyruvate = Reduced substrate
- b) Lactate = Reduced enzyme, NAD⁺ = reduced coenzyme, Pyruvate = Oxidized enzyme
- c) Lactate = Oxidized substrate, NAD⁺ = oxidized coenzyme, Pyruvate = Reduced Substrate
- d) Lactate = Reduced substrate, NAD⁺ = oxidized coenzyme, Pyruvate = Oxidized Substrate

CONCEPT: COENZYMES IN METABOLISM

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

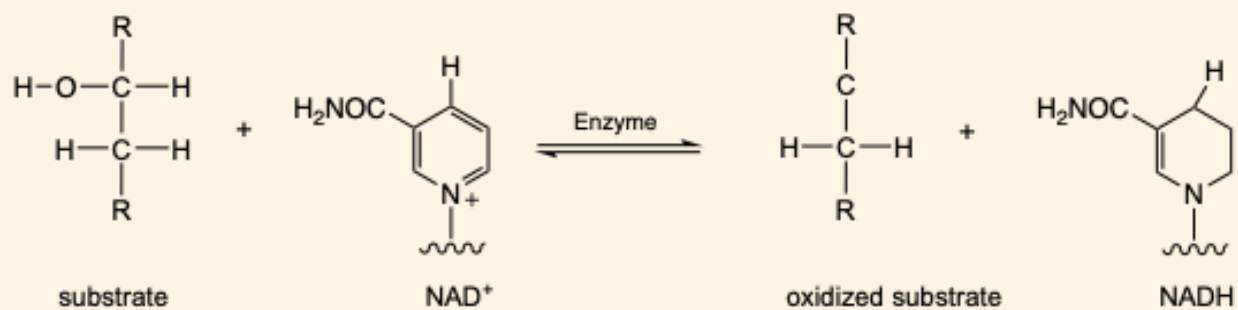
c) reduction, NAD⁺

d) reduction, NADH

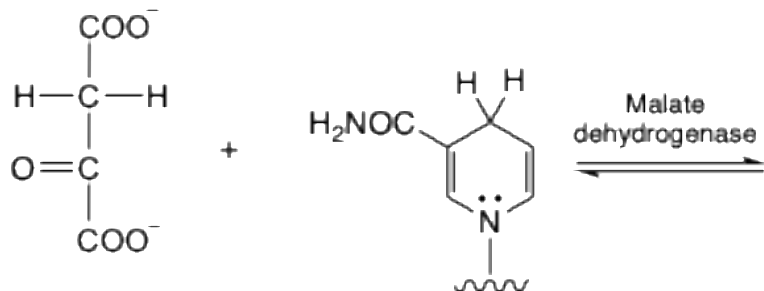
CONCEPT: COENZYMES IN METABOLISM

Oxidation with NAD⁺ Mechanism

- **Recall:** Nicotinamide group of NAD⁺ is the site of _____.
 - Basic residue (____) of enzyme abstracts ____ from -OH group of a substrate.
 - Hydride transfers to _____.



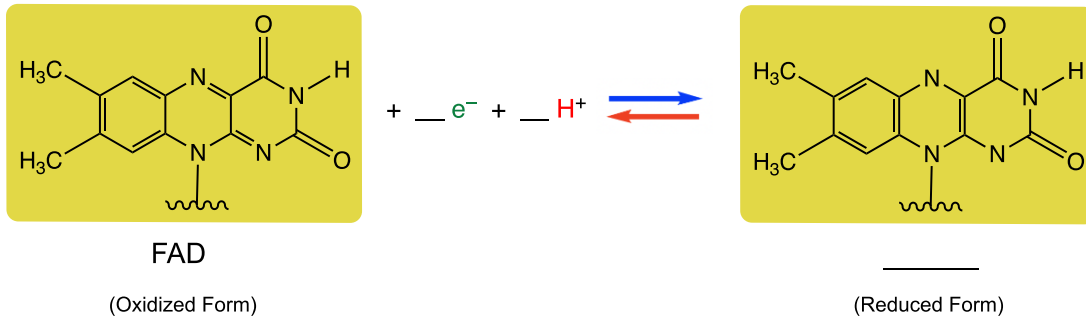
EXAMPLE: Reduction of oxaloacetate to malate is facilitated by NADH. Propose a mechanism for this reaction.



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 _____.

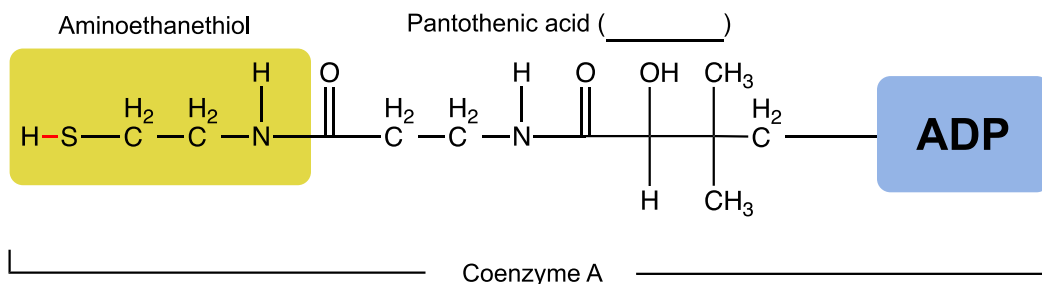


EXAMPLE: Select the correct statement.

- When FAD is reduced, it gains 2 hydrogen ions and 2 electrons, forming FADH.
- FAD represents an oxidized form of the coenzyme and acts as an oxidizing agent.
- FADH represents an oxidized form of the coenzyme and acts as a reducing agent.
- Reduction of FAD occurs at the adenine portion of the molecule.

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.



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

- When acetyl group is released from acetyl-S-CoA, it produces HS-CoA.
- Vitamin B is present in the active site of CoA.
- Primary role of CoA is to oxidize fatty acids.
- CoA is composed of pantothenic acid (vit B5), aminoethanethiol, and ADP.