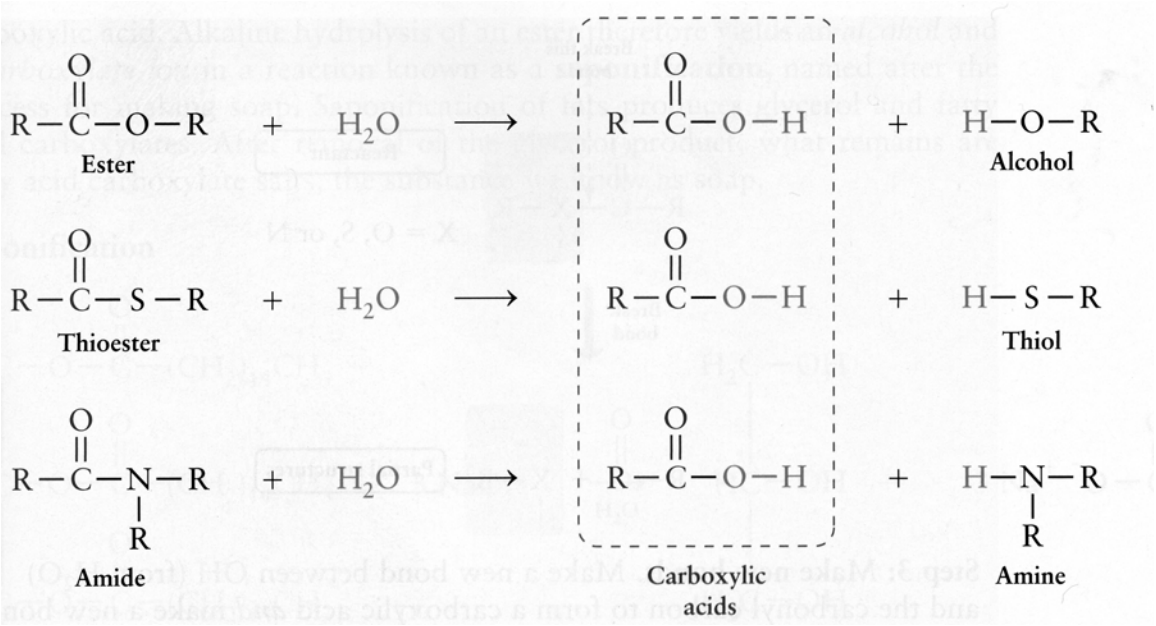
Takes notes while watching the following video tutorials to prepare for the "Organic Funct Grp Rxns Part 2 Activity".

Reactions of Organic Functional Groups Part 5: Acyl Transfer

What is an "Acyl Group"?

Acyl Group Transfer Reactions – 2 Pathways Catabolic & Anabolic

Acyl Group Hydrolysis Reactions



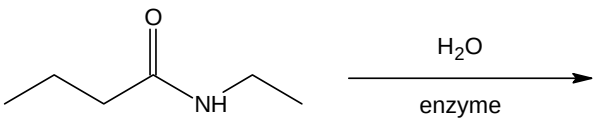
What happens to carboxylic acids at physiological pH? Draw the structure of acetic acid at physiological pH.

The ester for apple flavoring is methyl butanoate. Draw the skeletal-line structure for apple flavoring.

Write the hydrolysis reaction for apple flavoring at physiological pH.

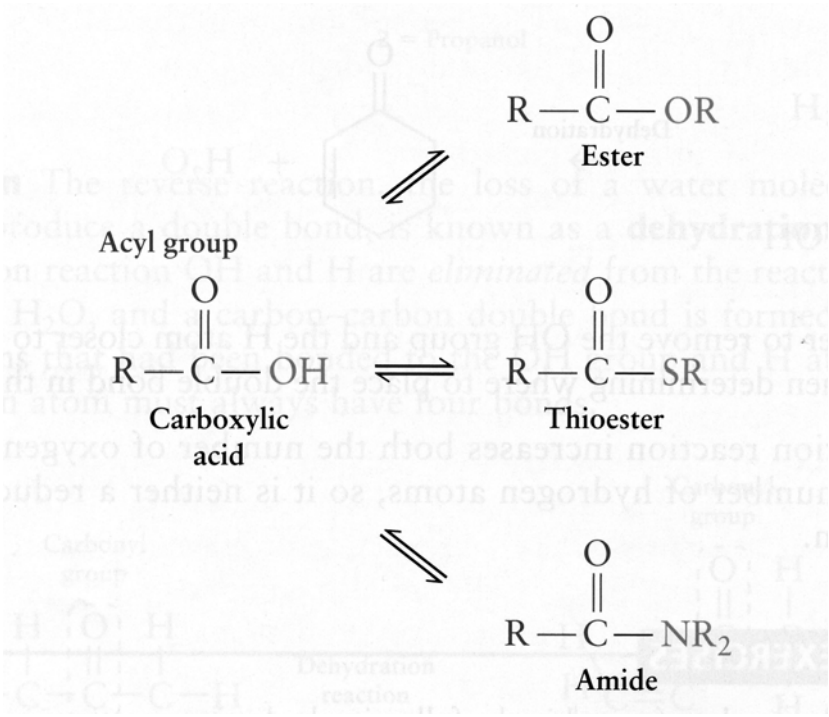
What happens to amines at physiological pH? Draw ethanamine at physiological pH.

Predict the products of the following enzyme catalyzed hydrolysis reactions at physiological pH.



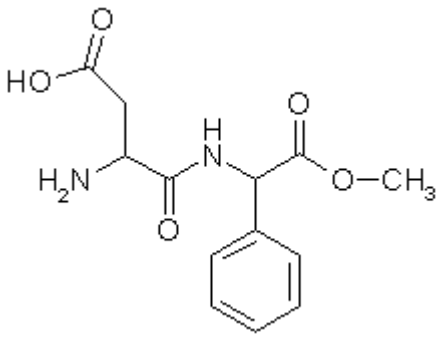
Acyl Derivative Formation

Add the missing reactants.



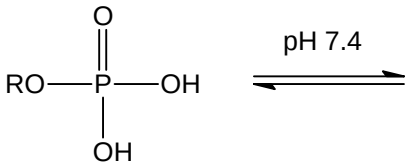
Show the reaction to form rum flavoring (ethyl formate) using acyl derivative formation.

Predict the hydrolysis products of aspartame at physiological pH.



Reactions of Organic Functional Groups Part 6: Phosphoryl Grp Transfer

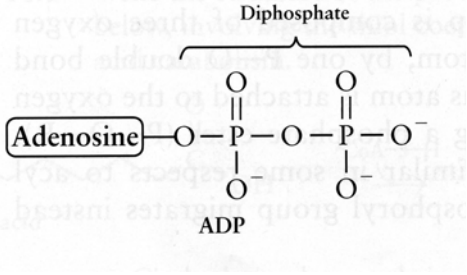
What is the effect of physiological pH on phosphate esters?



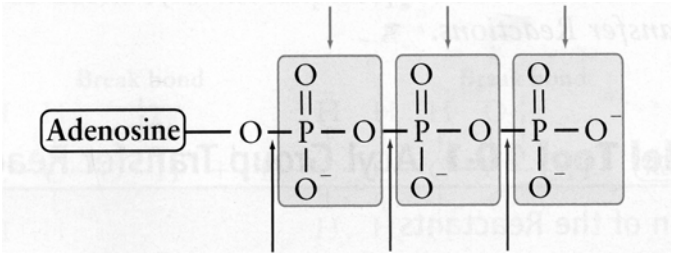
Phosphoryl Group Transfer Reactions

Phosphate esters are formed when 1 or more of the H atoms of phosphoric acid is (are) replaced with 1 or more R groups.

Phosphoanhydride bonds form when the O atoms of one phosphate group bonds with the P atom of another phosphate group.

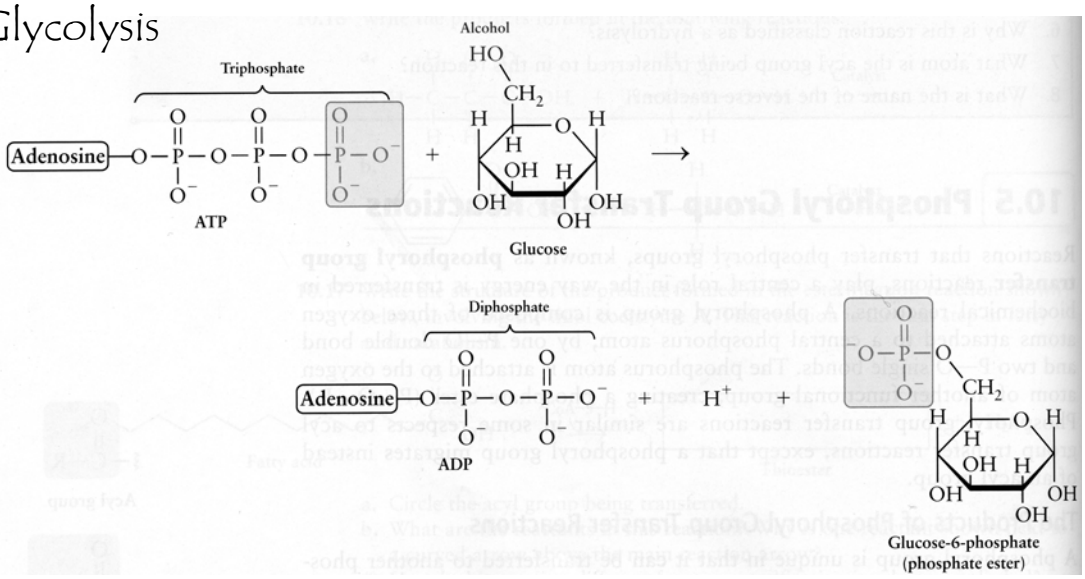


Label the Phosphate groups (Pi), Phosphate ester bonds and Phosphoanhydride bonds in the compound below.

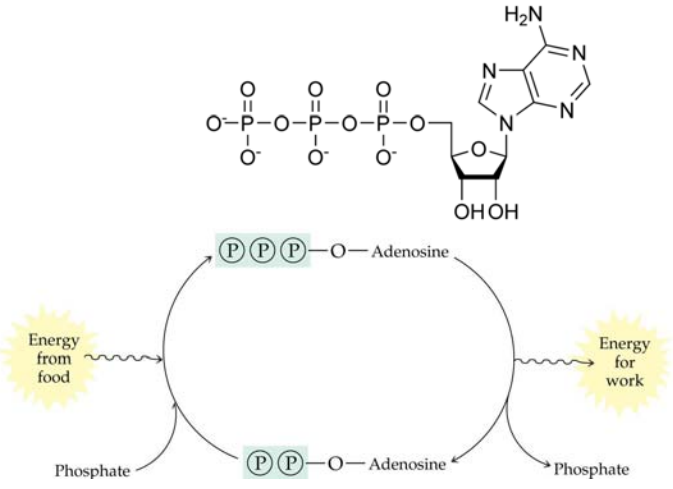


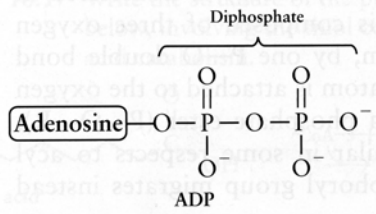
Phosphoryl groups play an important role in glycolysis. Glycolysis is the biochemical pathway that breaks down glucose to produce energy.

1st step of Glycolysis



Phosphoryl groups also play a central role in the way energy is transferred in biochemical reactions. Our body stores and transports energy in the phosphoanhydride bonds of ATP.
Draw an arrow to the phosphoanhydride bond that is broken and reformed as ATP converts back and forth to ADP.





Reactions of Organic Functional Groups Part 7: Coenzymes & Redox Rxns

Oxidation and Reduction reactions ALWAYS occur together.

To oxidize or reduce a biological molecule, we need a second compound that can donate or accept the electrons. Coenzymes are the second compound.

Coenzymes: special molecules that shuttle electrons

Common Oxidizing and Reducing Agents

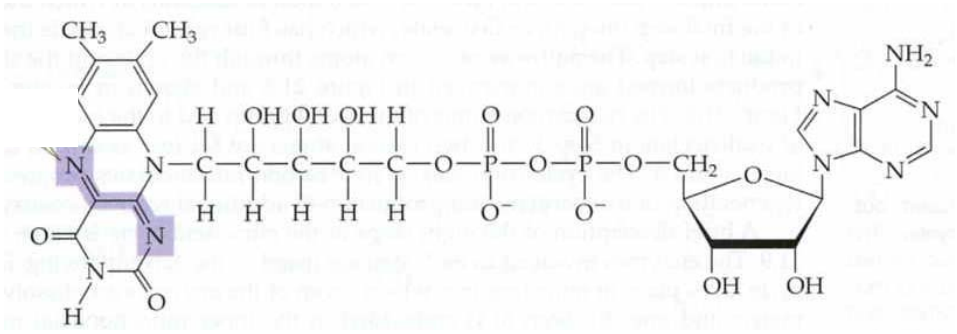
Oxidizing Agents	Formula or Rxn
Bleach	NaOCl
Oxygen	O_2
Hydrogen peroxide	H_2O_2
Chromium(VI)	Cr^{6+}
Manganese (VIII)	MnO_4^-
NAD^+	Coenzyme $NAD^+ + 2H^+ + 2e^- \rightarrow NADH + H^+$
FAD	Coenzyme $FAD + 2[H] \rightarrow FADH_2$
Reducing Agents	
Hydrogen	H_2
NADPH	Coenzyme $NADPH + H^+ \rightarrow NADP^+ + 2[H]$

Note the difference

Coenzymes – a closer look at the 3 Most Important

FAD/$FADH_2$

FAD is the H Acceptor when C=C (double) bonds form



Circle the reactive region of FAD and $FADH_2$.

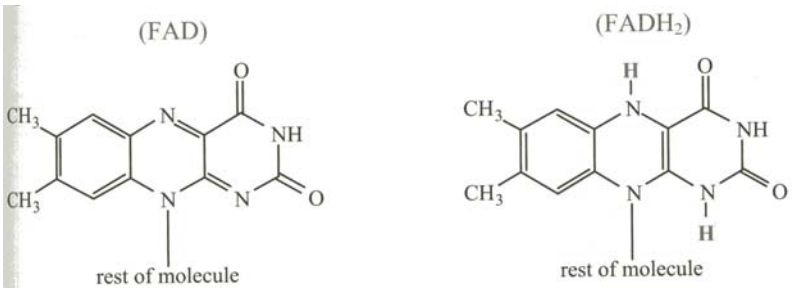
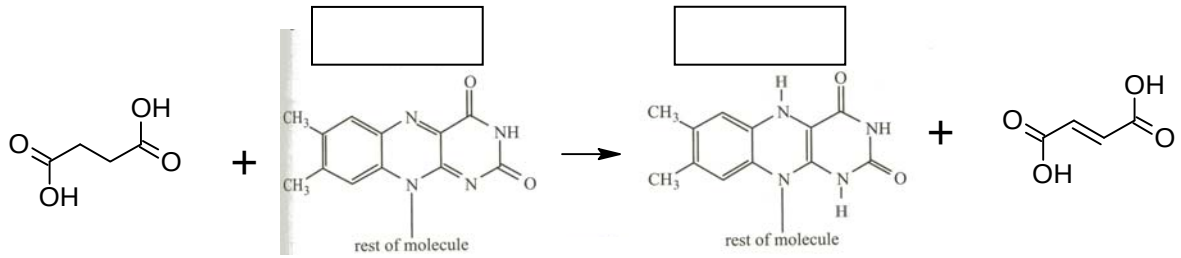


Diagram the reaction below to indicate the oxidation and reduction ½ reactions. Label each ½ reaction (oxidation or reduction). For the coenzyme, label FAD/$FADH_2$.



NAD⁺/NADH

NAD⁺ is the H Acceptor in Most Oxidations

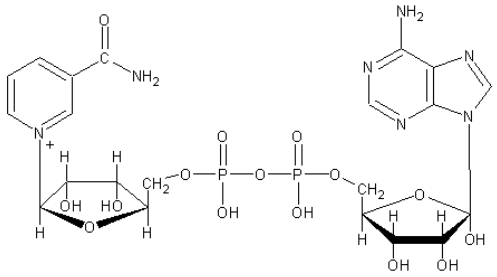
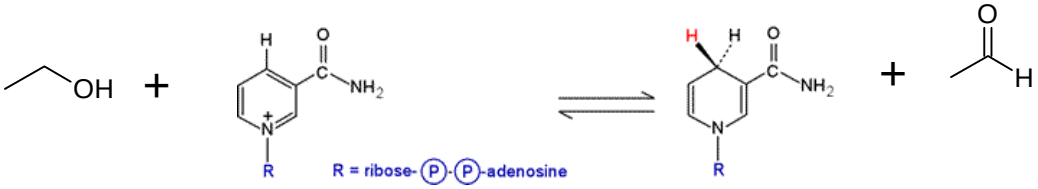


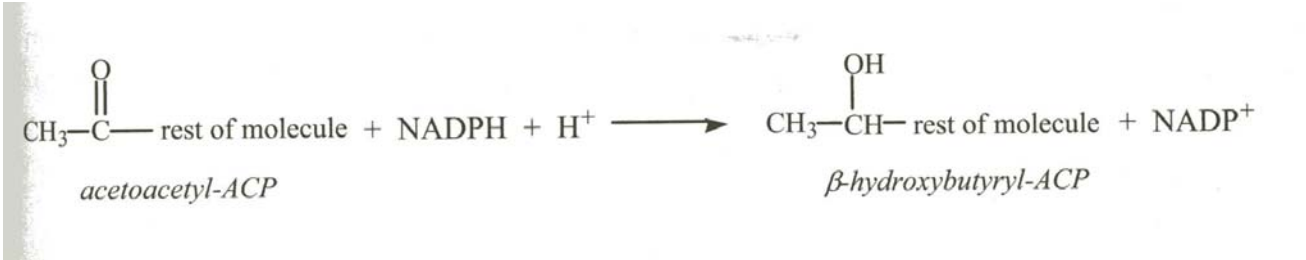
Diagram the reaction below to indicate the oxidation and reduction ½ reactions. Label each ½ reaction (oxidation or reduction). For the coenzyme, label NAD⁺/NADH.



NADPH/NADP⁺

NADPH is the H Donor in Reduction Reactions

Diagram the reaction below to indicate the oxidation and reduction ½ reactions. Label each ½ reaction (oxidation or reduction). For the coenzyme, label NADPH/NADP⁺.



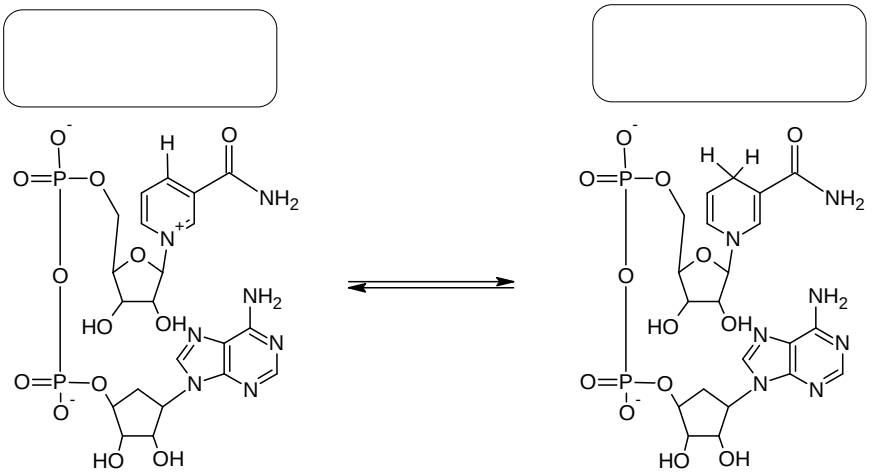
The reactions for two important pairs of coenzymes are shown below.

a) Name them: NAD^+, NADH, FAD, and $FADH_2$.
Hint: Look closely at the chemical structures to find the differences.

b) Label each one of the coenzymes as an oxidizing agent or reducing agent.

Reaction 1

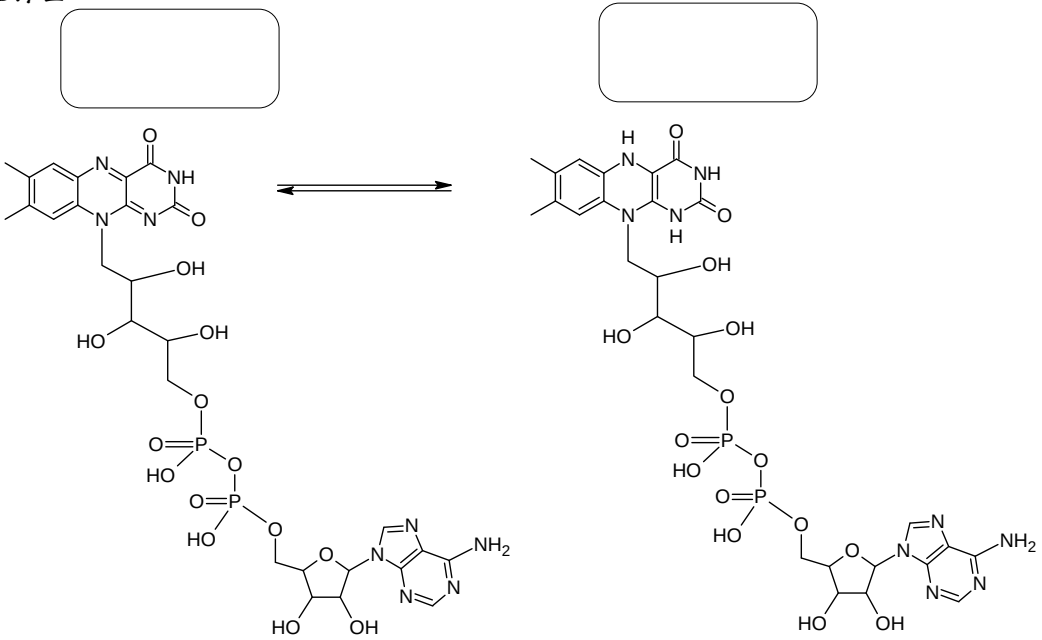
a)



b)

Reaction 2

a)



b)

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