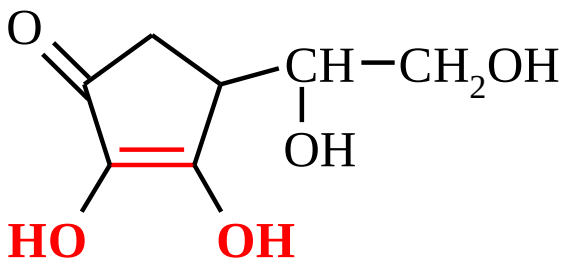
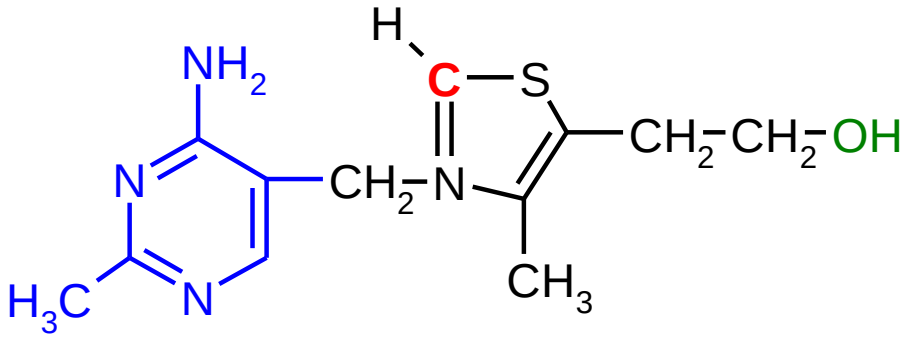
Vitamin C (ascorbic acid)



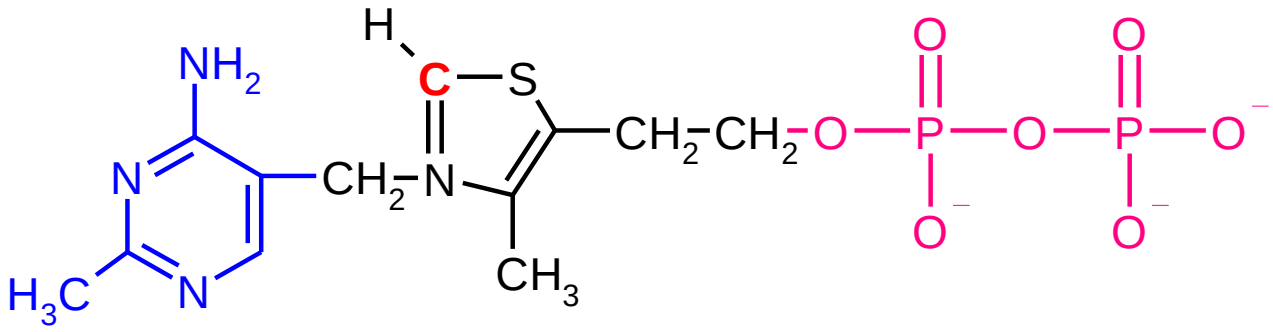
Ascorbic acid

Chemical Forms of Thiamine (B1)



Thiamine

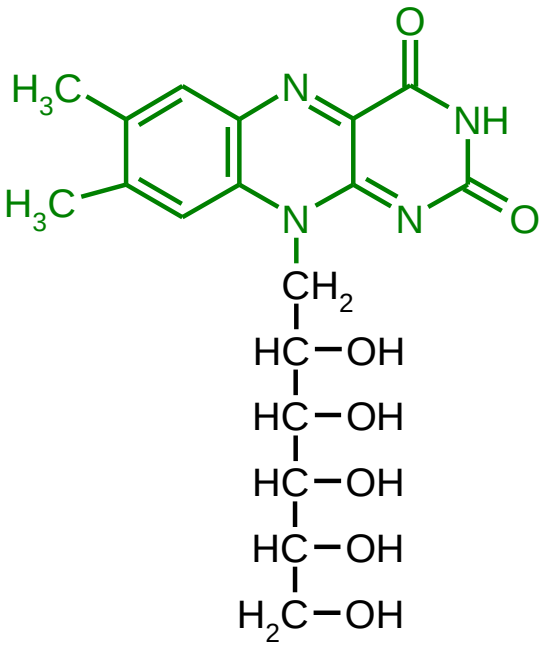
- Pyrimidine ring Shown in blue
- The reactive C Shown in red



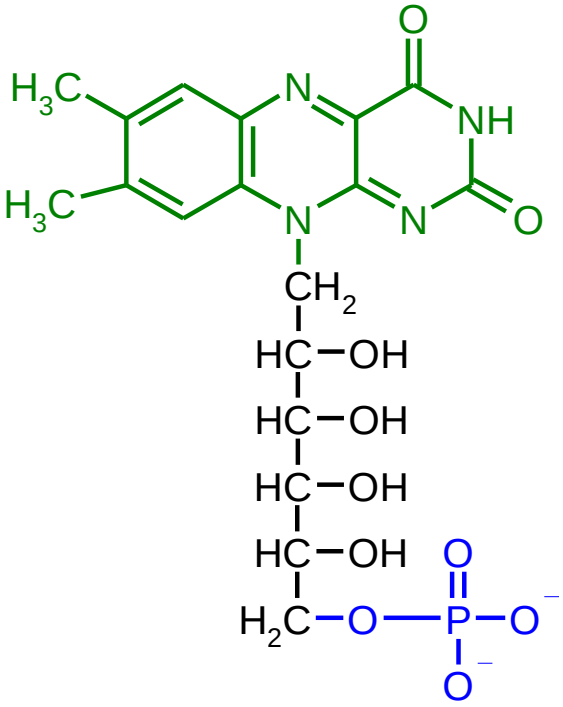
Thiamine Pyrophosphate

- We modify making a phosphate ester Shown in pink

Chemical Forms of Riboflavin (B2)



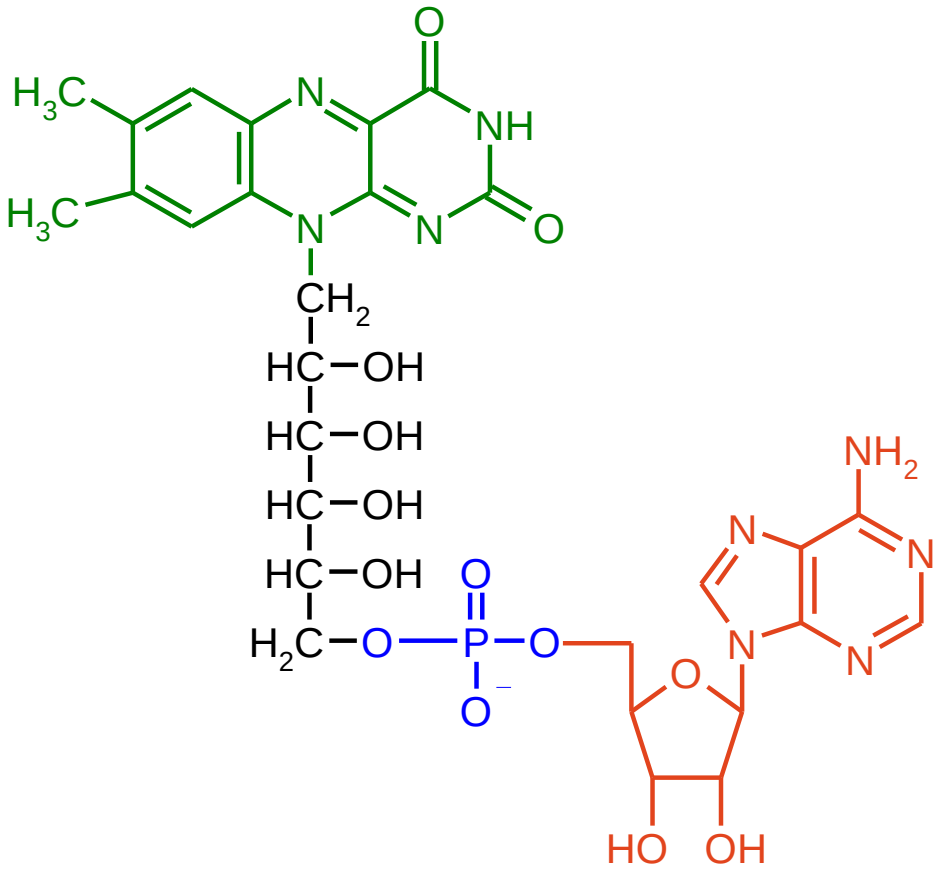
Riboflavin-the flavin rings are shown in green



FMN
Flavin Mononucleotide

We modify riboflavin by a phosphate ester shown in blue.

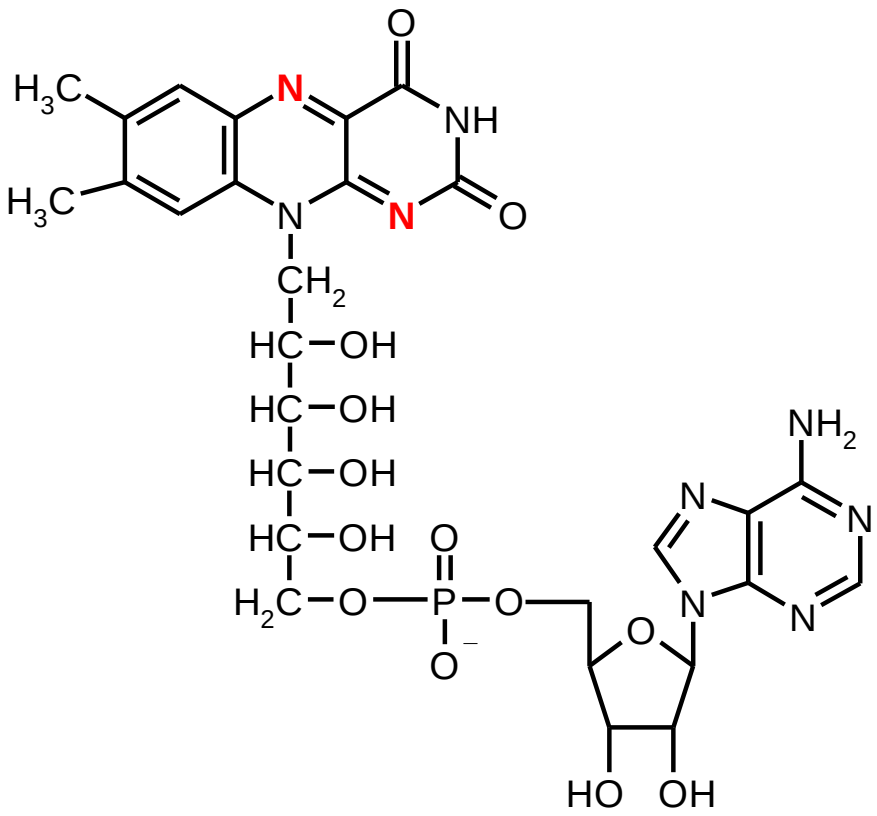
Chemical Forms of Riboflavin (B2) continued



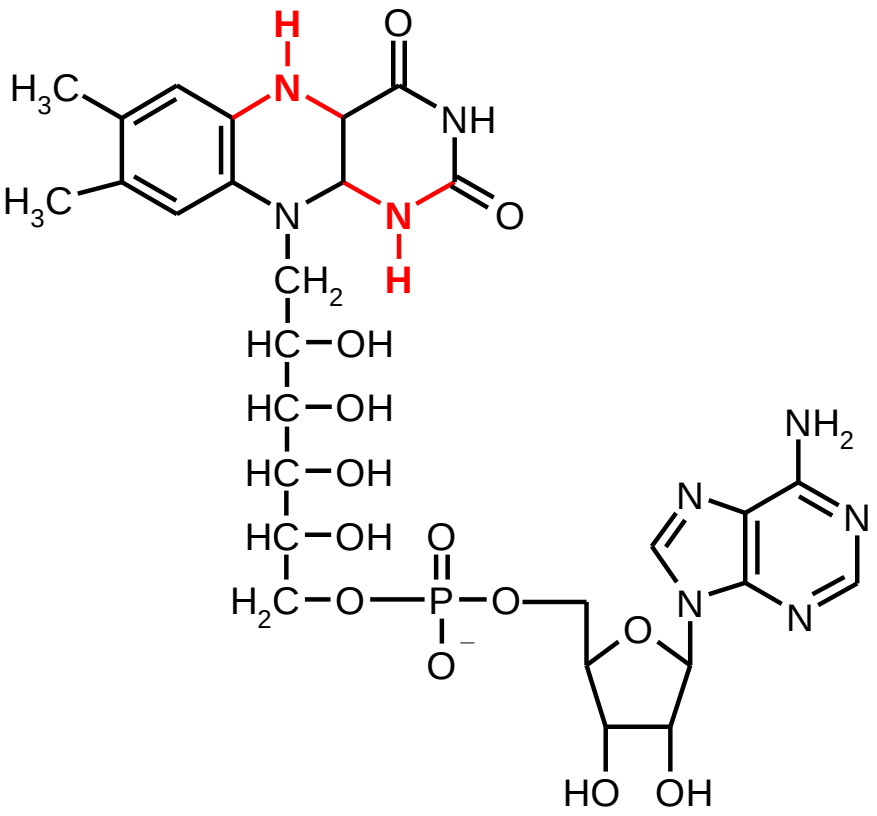
FAD-Flavin Adenine Dinucleotide

We modify FMN by adding a ribose and adenine ring shown in red.

Actions of Riboflavin (B2)

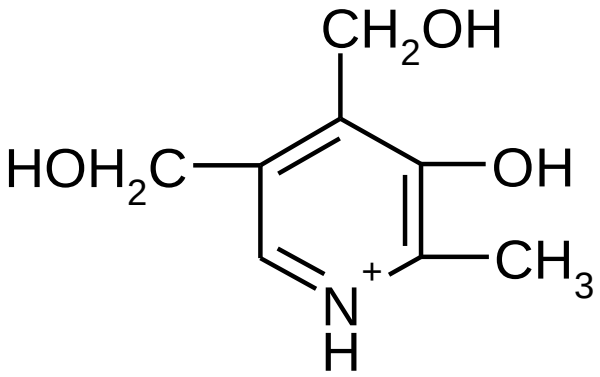


FAD Oxidized
Oxidation/reduction
sites are shown in red.

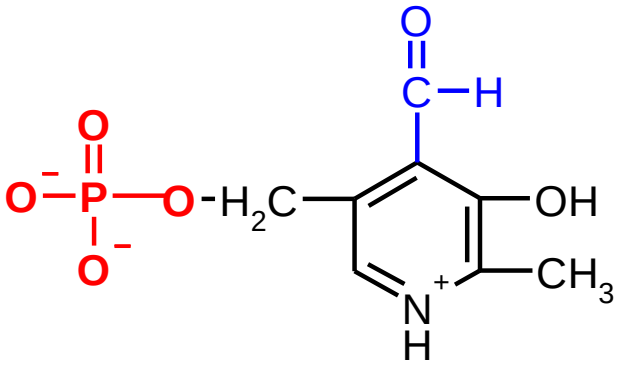


$FADH_2$ Reduced
Oxidation/reduction
sites are shown in red.

Chemical Forms and Actions Pyridoxine (B6)

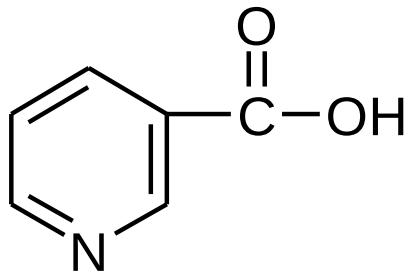


Pyridoxine



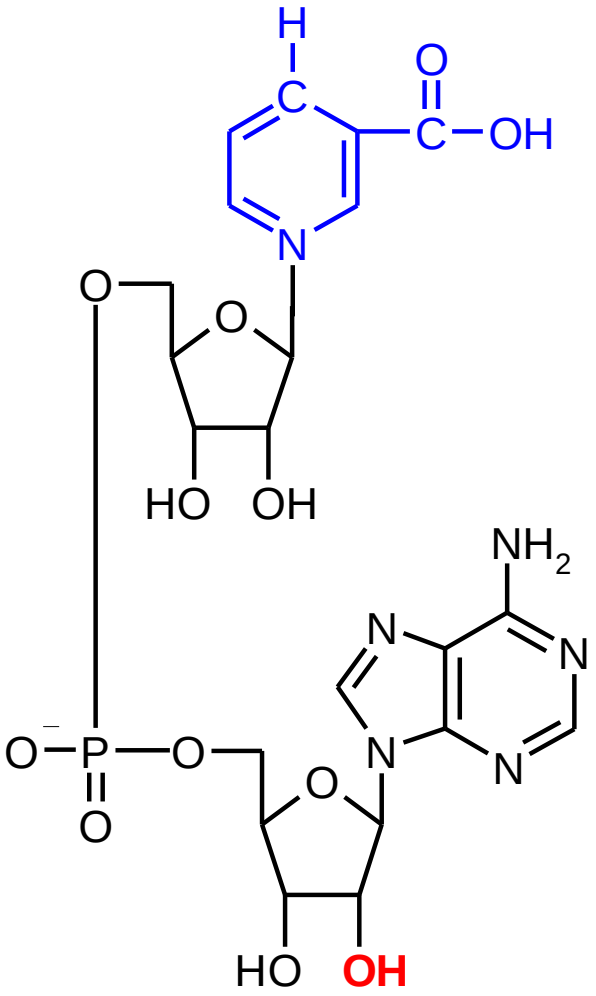
Pyridoxal Phosphate
We modify by addition
Of phosphate ester (red)
And oxidation of an alcohol
to an aldehyde (blue)

Chemical Forms of Niacin

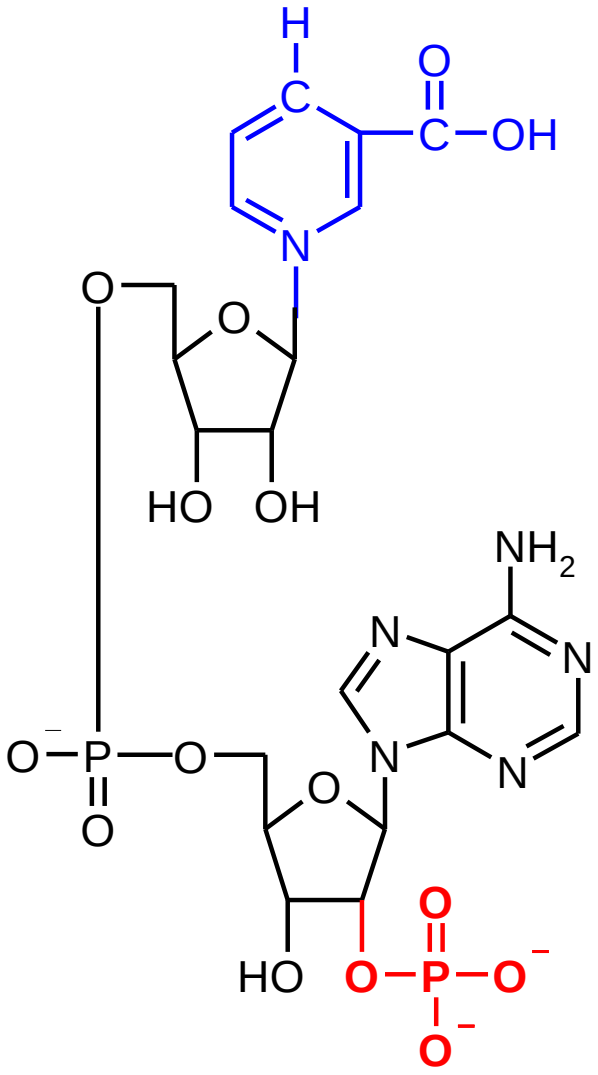


Niacin

Chemical Forms of Niacin Continued

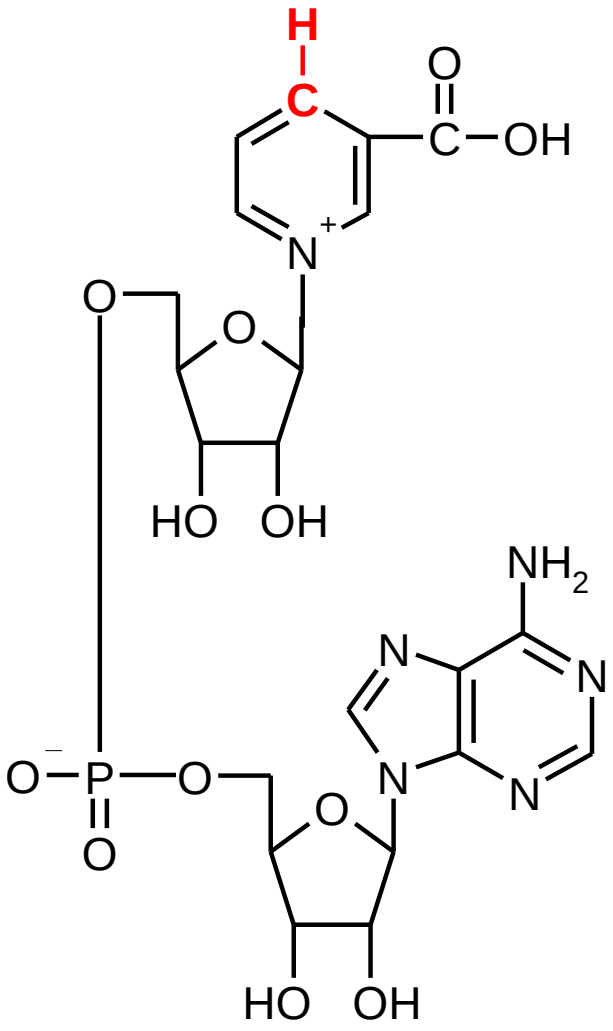


NAD
Nicotinamide Adenine Dinucleotide
The nicotinamide is shown in blue.

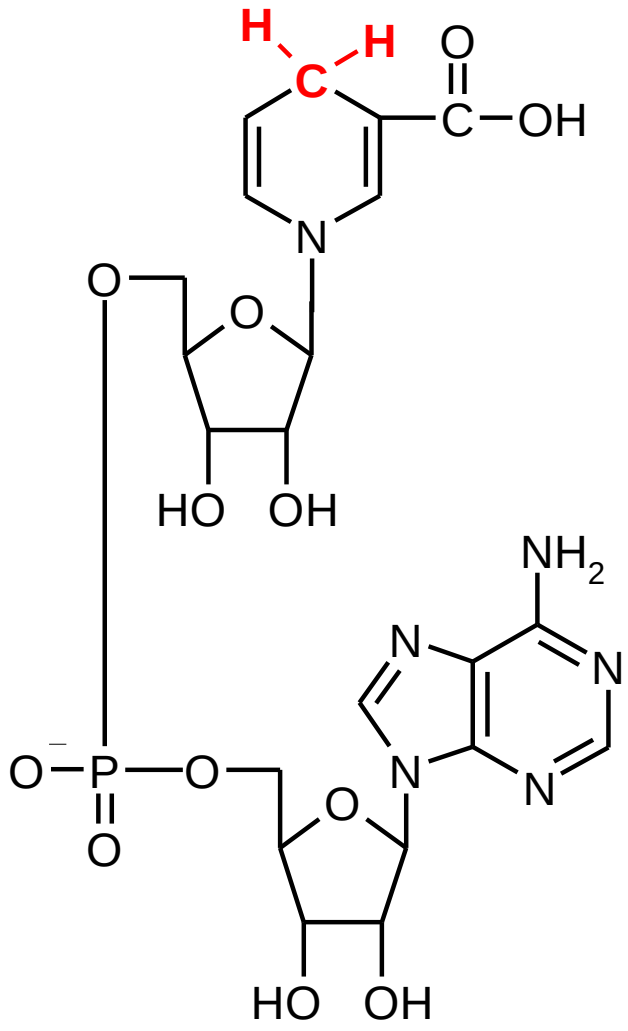


NADP
Nicotinamide Adenine Dinucleotide
The nicotinamide is shown in blue.

Actions of Niacin

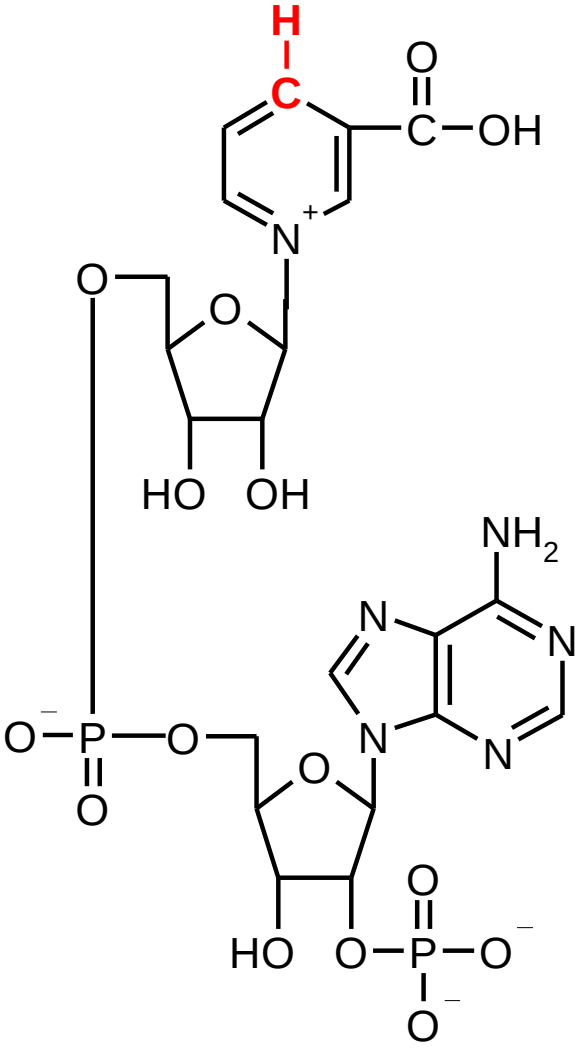


NAD^+ Oxidized
Oxidation/reduction sites shown in red.

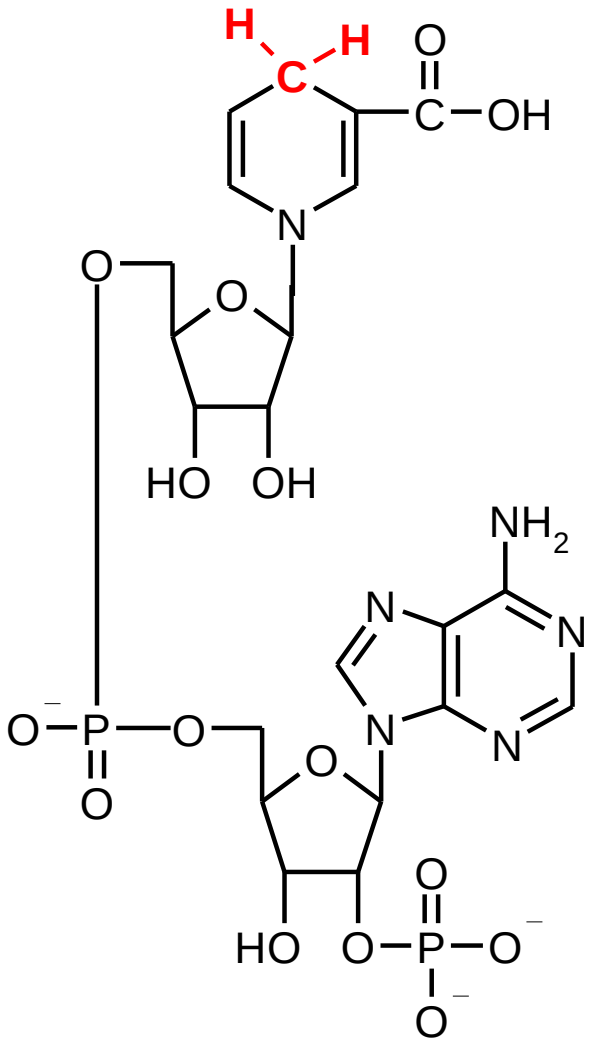


NADH Reduced
Oxidation/reduction sites shown in red.

Actions of Niacin continued

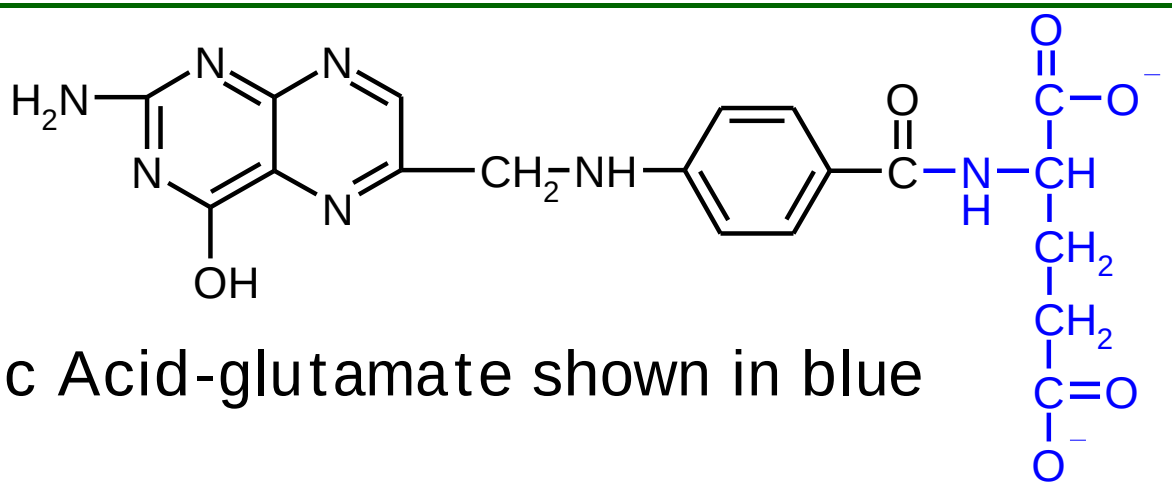


NADP+ Oxidized
Oxidation/reduction sites shown in red.

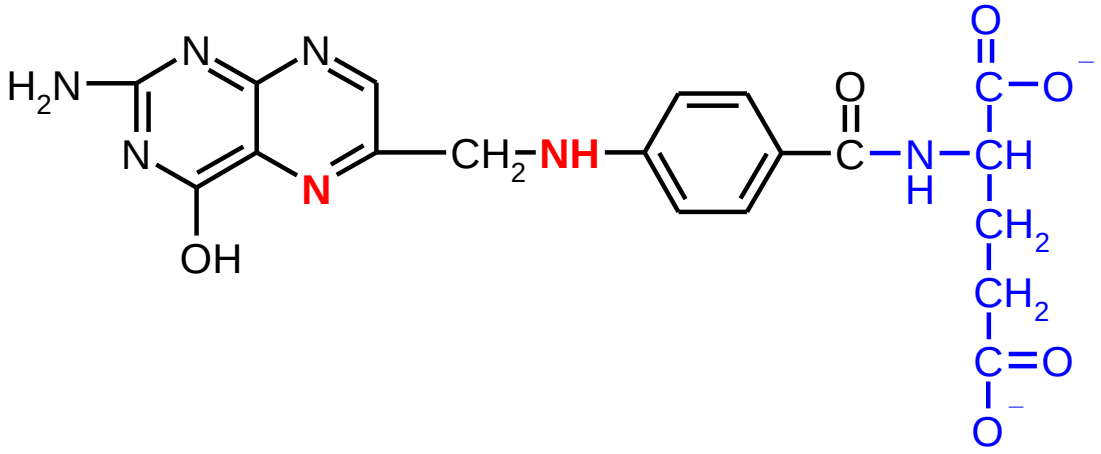


NADPH Reduced
Oxidation/reduction sites shown in red.

Chemical Forms and Actions of Folic Acid

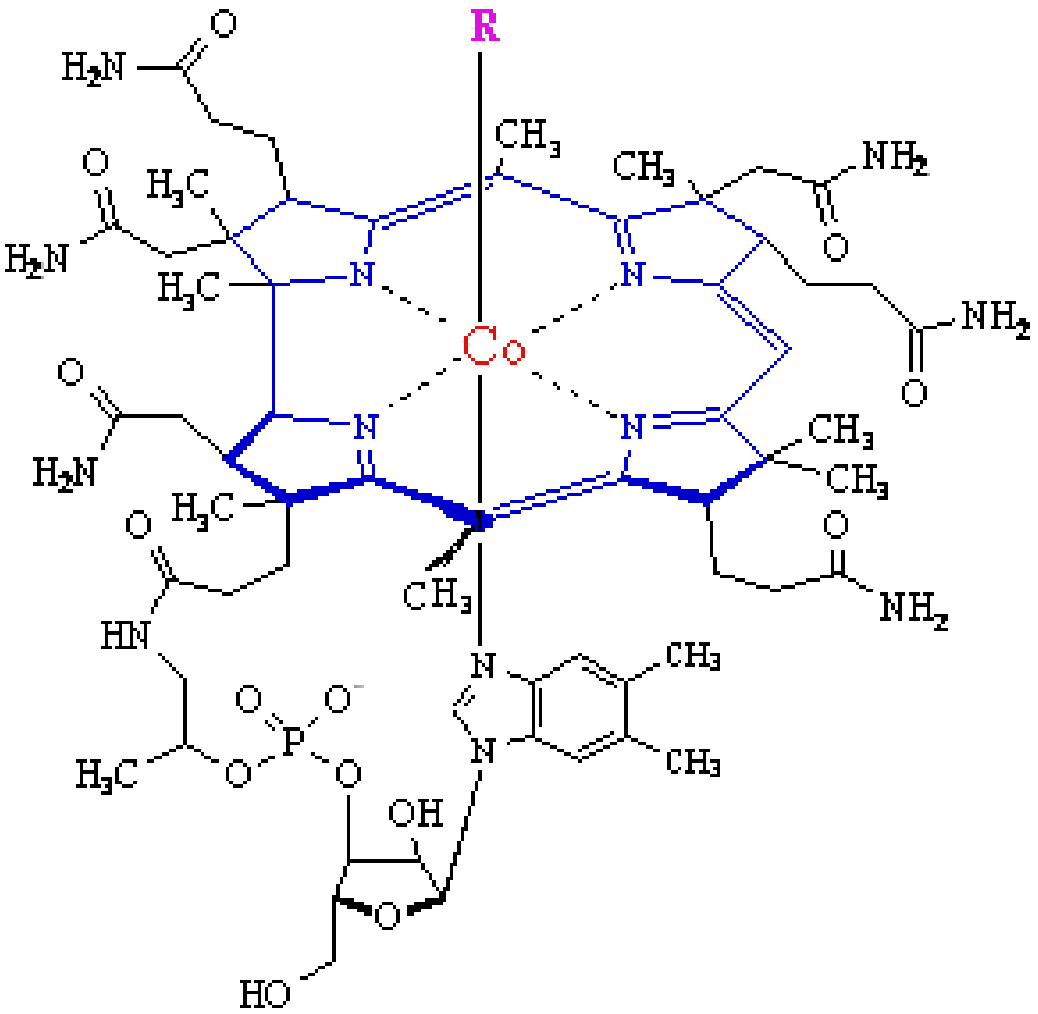


Folic Acid-glutamate shown in blue

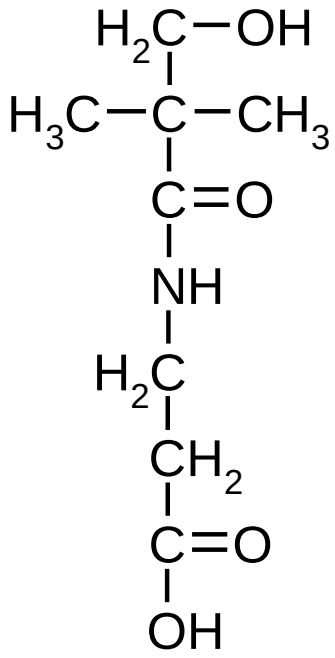


Folate is modified to tetrahydrofolate (with 5 glutamates). Tetrahydrofolate (THF) carries methyl groups at the nitrogens shown in red

Chemical Forms of B_{12}

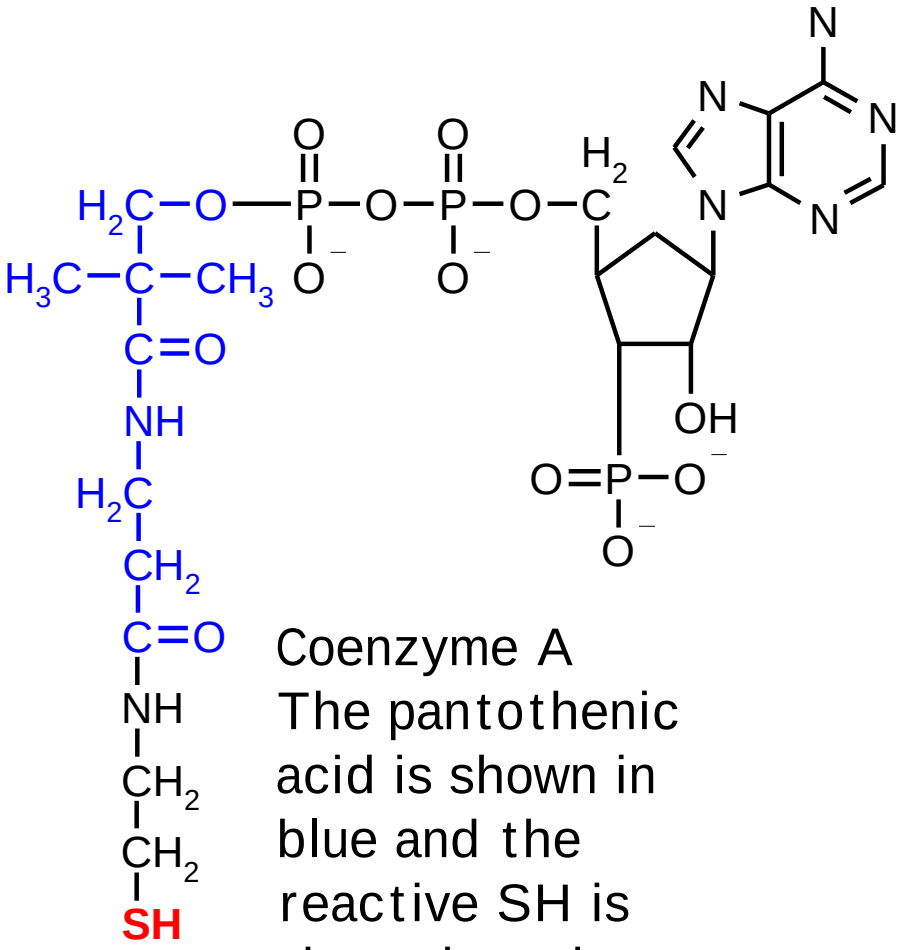


Chemical Forms of Pantothenic acid

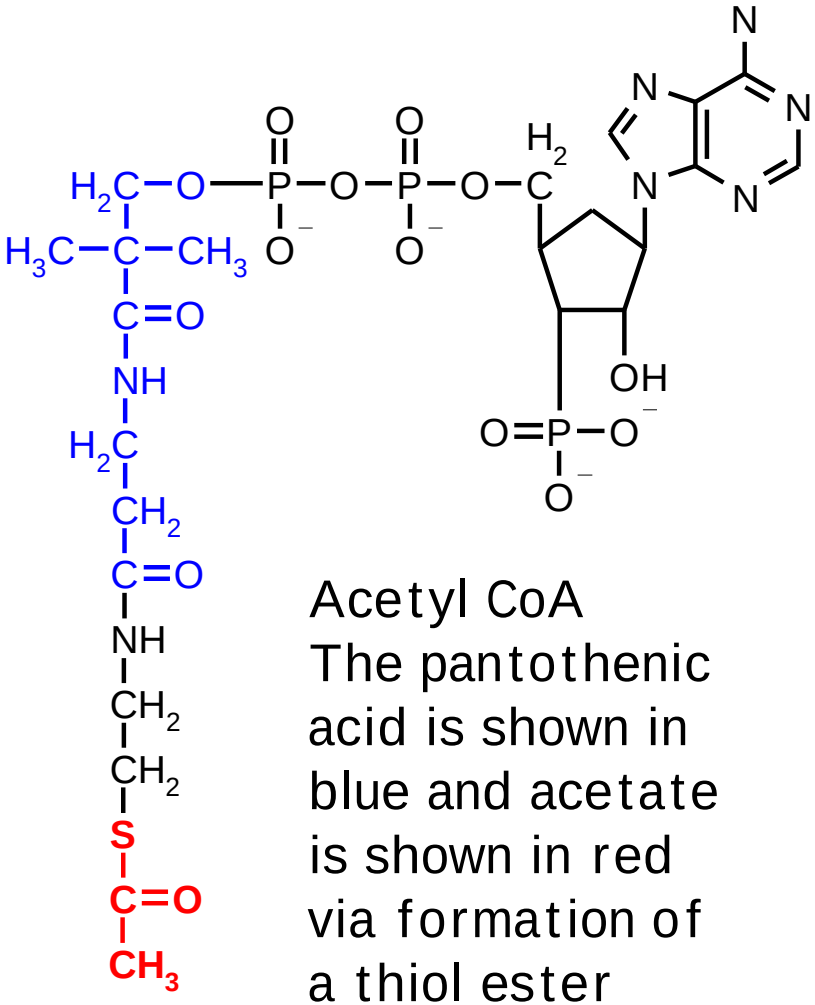


Pantothenic Acid

Actions of Pantothenic acid

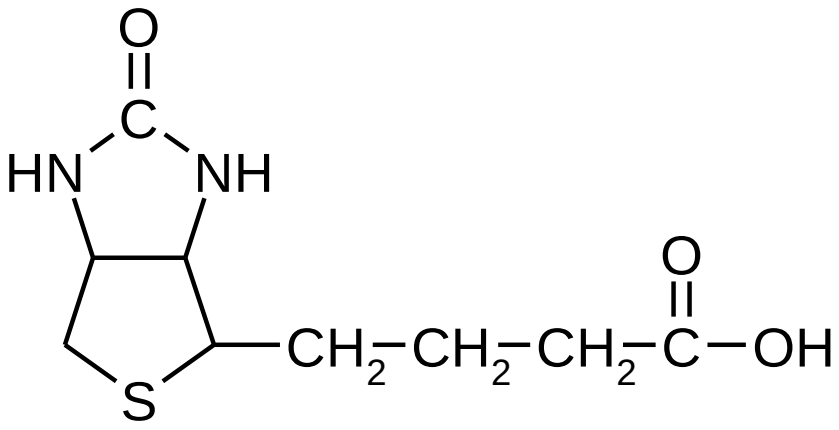


Coenzyme A
The pantothenic acid is shown in blue and the reactive SH is shown in red

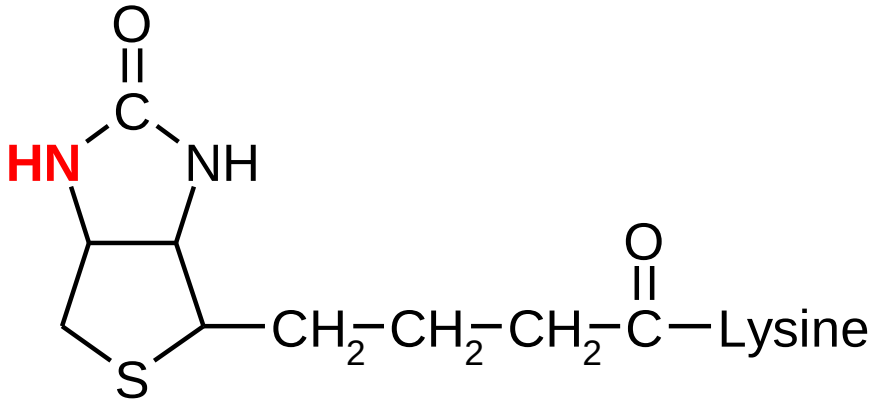


Acetyl CoA
The pantothenic acid is shown in blue and acetate is shown in red via formation of a thiol ester

Chemical Forms and Actions of Biotin

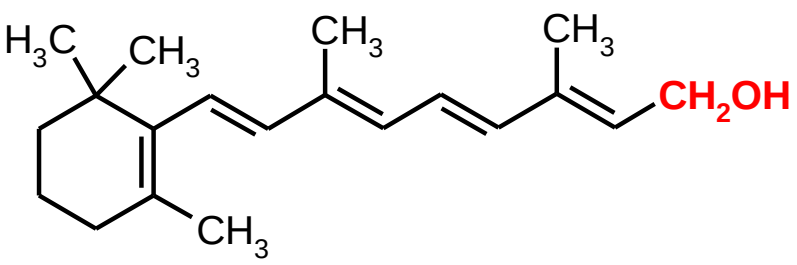


Biotin

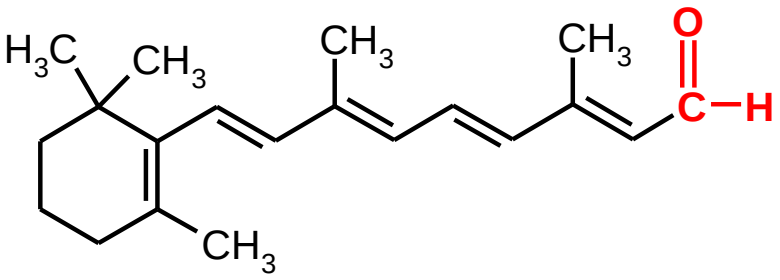


Biotin is attached to the enzyme through a Lysine residue. The N shown in red is where the CO_2 is carried.

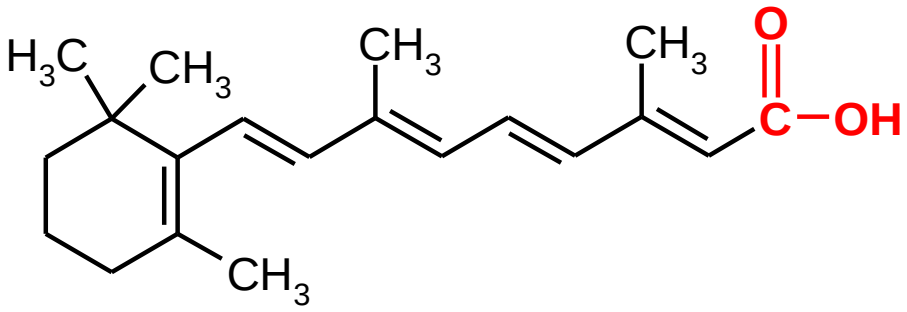
Chemical Forms and Actions Vitamin A



Vitamin A-retinol

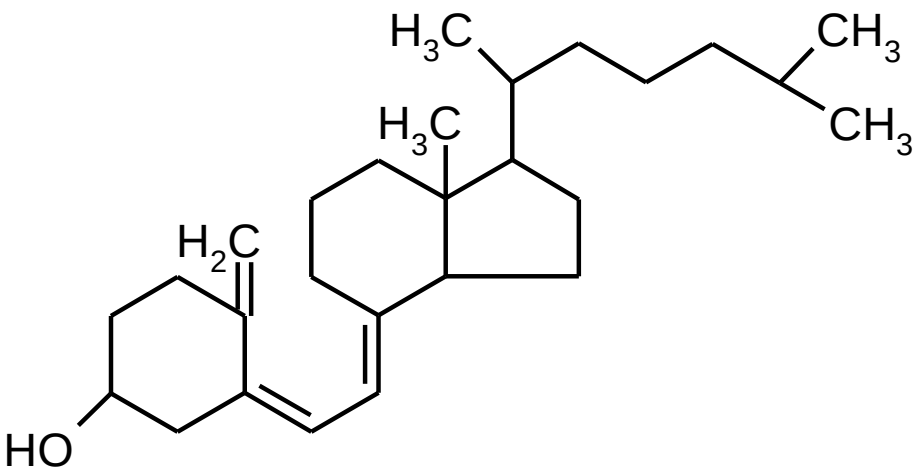


Retinal

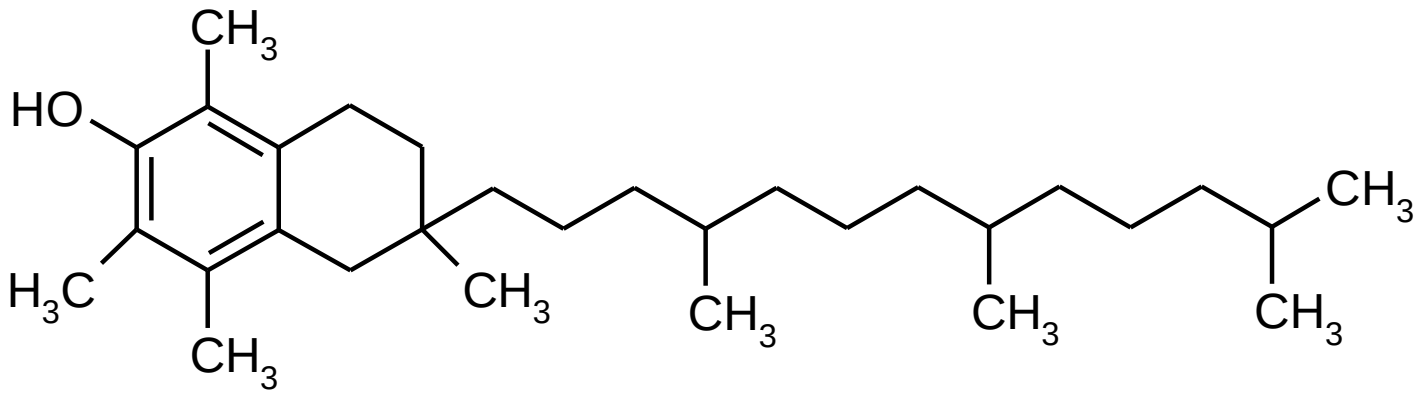


Retinoic Acid

Chemical Forms of Vitamin D



Chemical Forms of Vitamin E (tocopherols)



Chemical Forms of Vitamin K