VITAMINS(II)



Chapter Objectives:

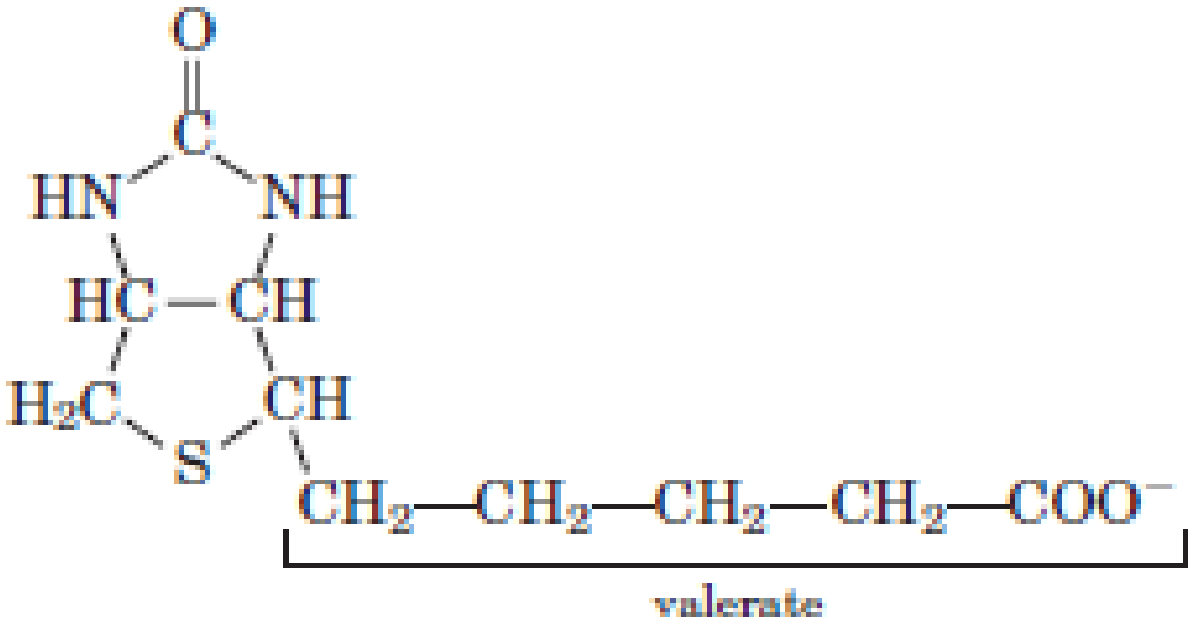
- **WATER SOLUBLE VITAMINS STRACTURE AND FUNCTIONS**
- **NIACIN (NICOTINIC ACID)**
- **PANTOTHENIC ACID**
- **MINERALS AND FUNCTIONS**

WATER SOLUBLE VITAMINS

- These include the B-vitamins and vitamin C
- They are soluble in water and can therefore be excreted in the urine
- They share few common properties besides their solubility characteristics
- Most of these vitamins act as coenzymes

WATER SOLUBLE VITAMINS

(Biotin) STRUCTURE OF B_7

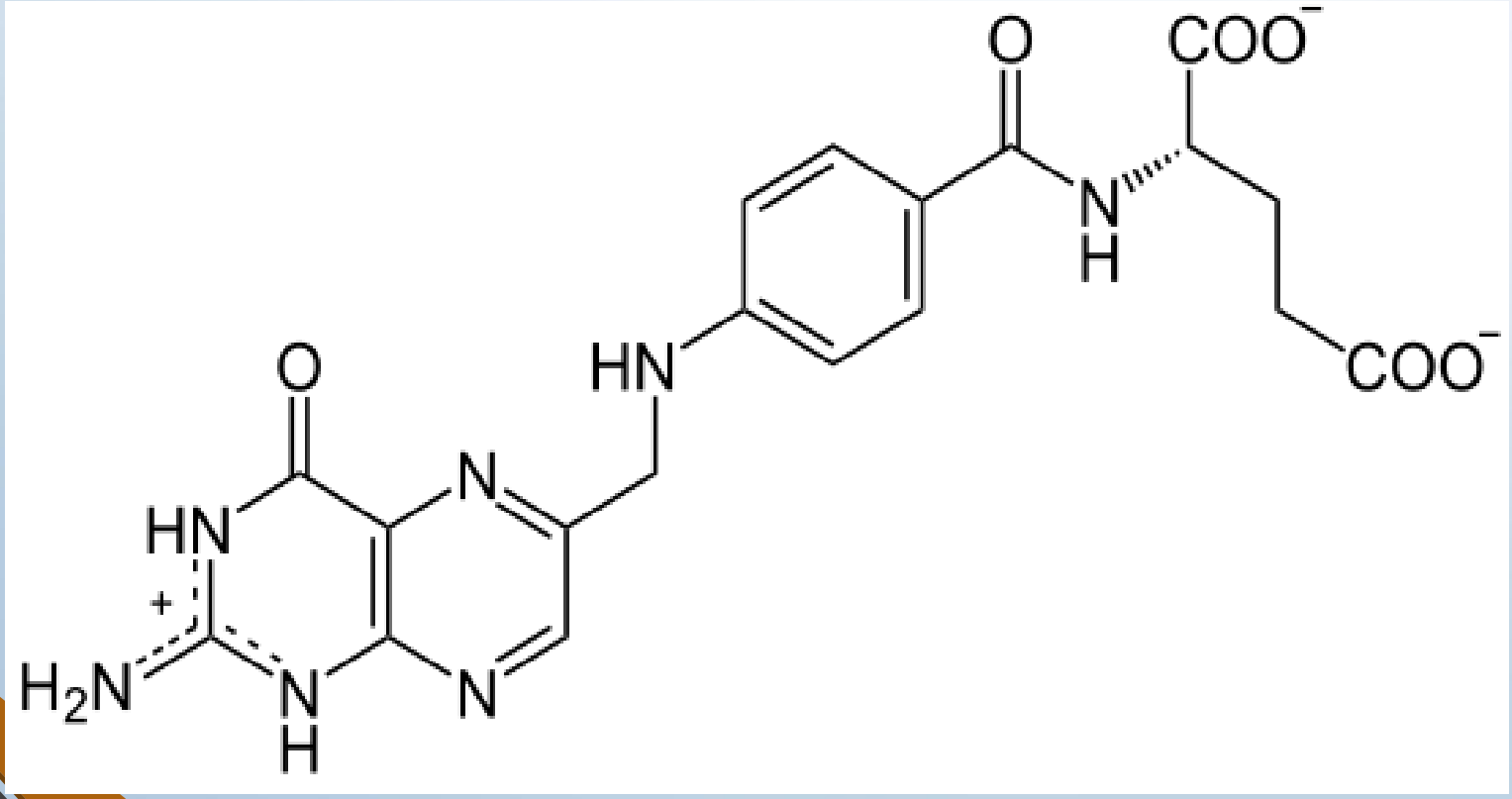


Biotin

- Function: Biotin acts as a coenzyme in carboxylation reactions in covalent linkage to lysine side chains of enzymes.
- Effect of Deficiency: Dermatitis, anorexia, nausea, muscle pain
- Sources: Intestinal microorganisms, liver, vegetables
- RDA: An RDA has not been established.

WATER SOLUBLE VITAMINS

STRUCTURE OF VIT.B9

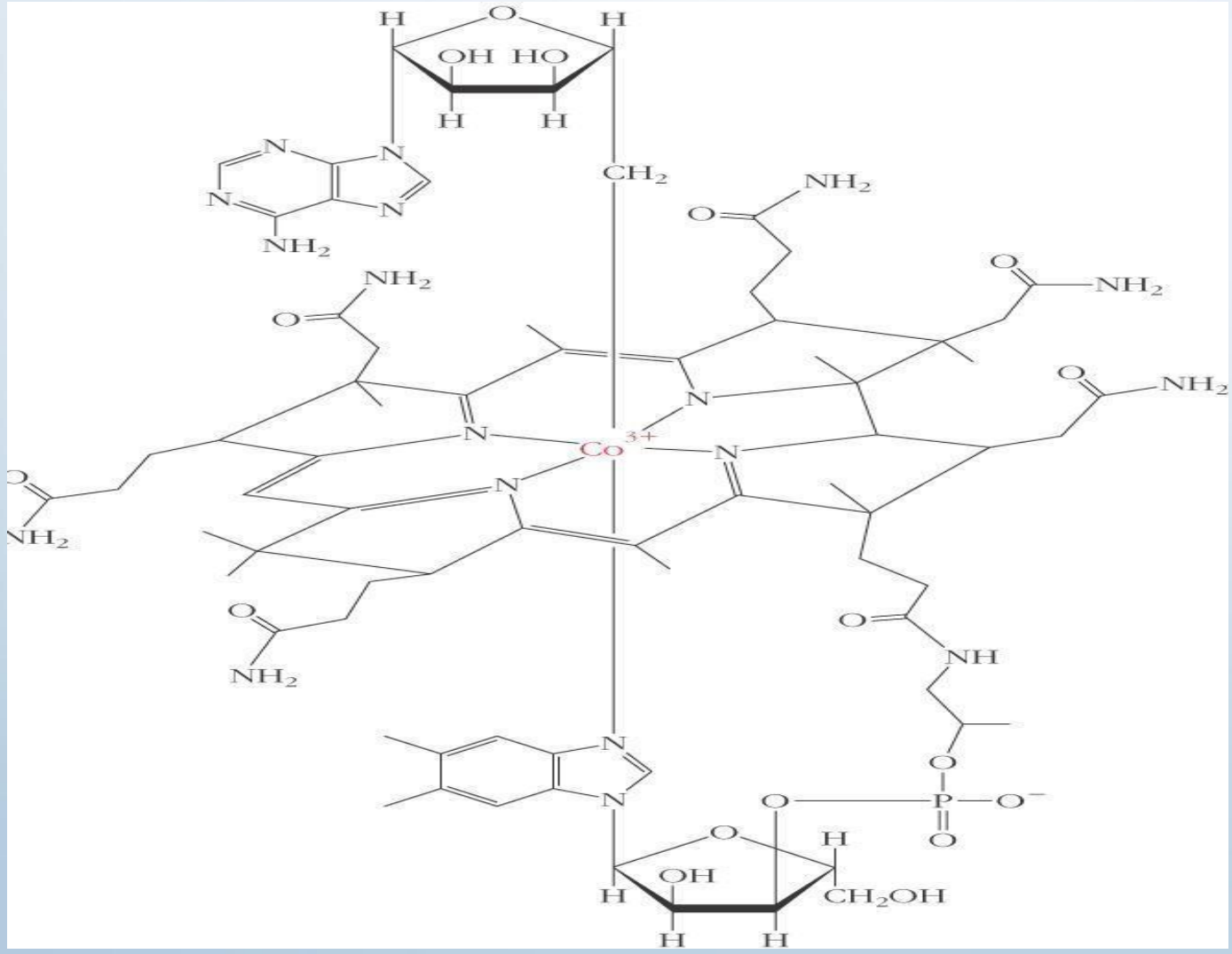


- Function: Folic acid is a precursor for tetrahydrofolate that is used as a carrier of one carbon units at different levels of oxidation.

- Effect of Deficiency: anemia
- Sources: Intestinal bacteria, liver, yeast and green vegetables

- RDA: 400 µg/day.
- folic acid deficiency was the most common vitamin deficiency in the United States

VITAMIN B12 (COBALAMIN)



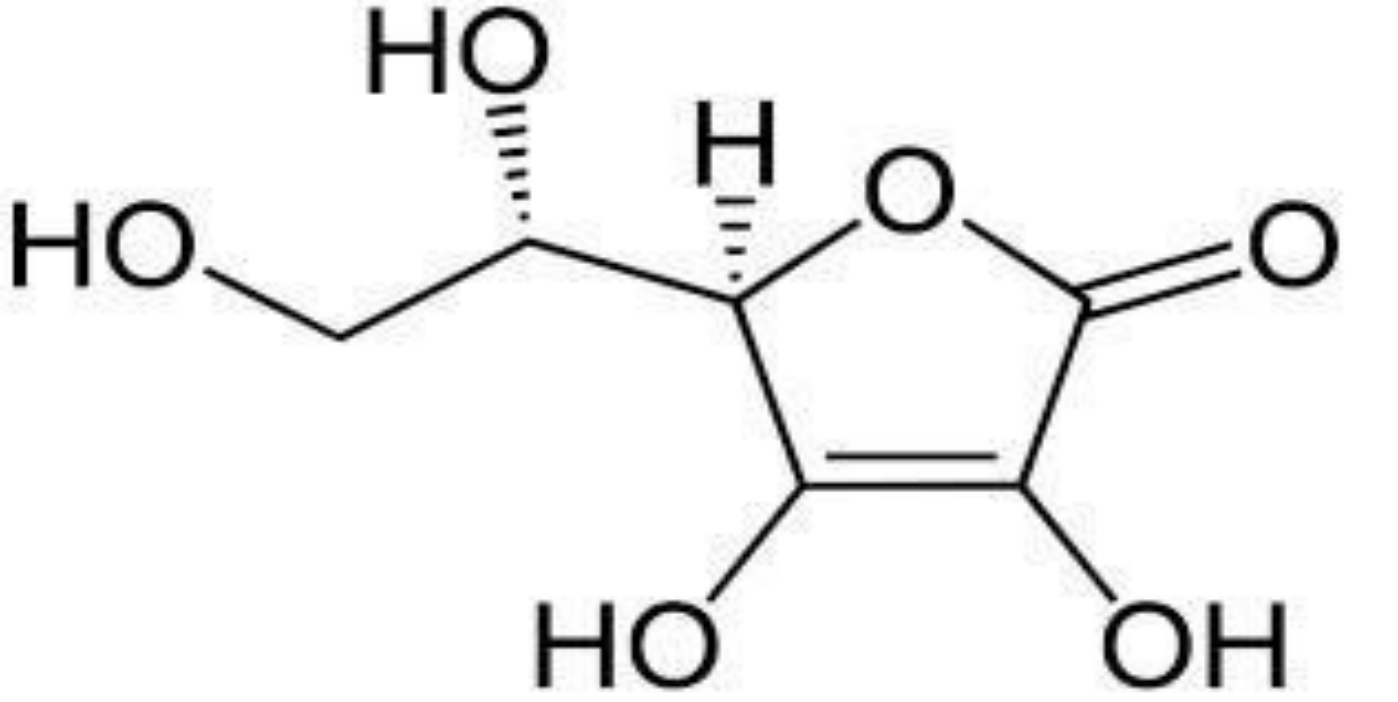
- Chemical Nature: Vitamin B12 is a complex multiple ring structure which includes a cobalt metal.
- Function: Vitamin B12 (cobalamin) derived cofactors are used for two important reactions:
- I. methylmalonyl CoA isomerase requires 5-deoxyadenosyl cobalamin
- II. Homocysteine: tetrahydrofolate methyl transferase requires methyl cobalamin and N5-methyltetrahydrofolate
- Effect of Deficiency: Pernicious anemia and degeneration of spinal cord neurons

- Oral manifestations:, hemorrhagic gingiva, halitosis, detachment of periodontal fibers

- Sources: Meat and milk
- RDA: 3 µg/day

WATER SOLUBLE VITAMINS

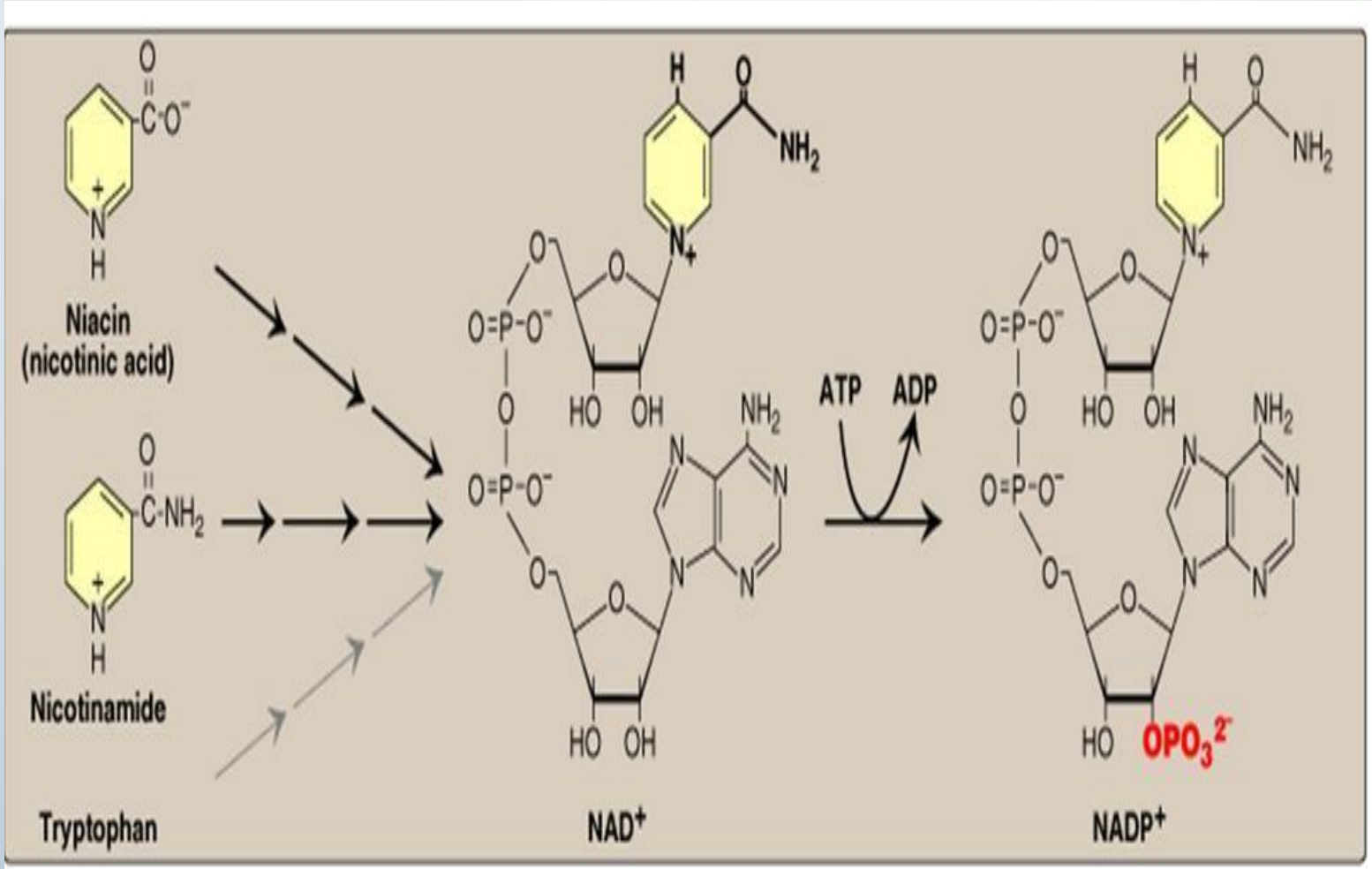
STRUCTURE OF VIT.C



- Function: Ascorbic acid is a water soluble antioxidant and it promotes the hydroxylation of proline residues of collagen.
- Ascorbic acid is also required in the synthesis of carnitine, dopamine and bile acids.
- Effect of Deficiency: Scurvy (hemorrhage, impaired wound healing and bone formation).
- - Oral manifestations: Bleeding gums, loose teeth
- Sources: Fruits and vegetables
- RDA: 60 mg/day

NIACIN (NICOTINIC ACID)

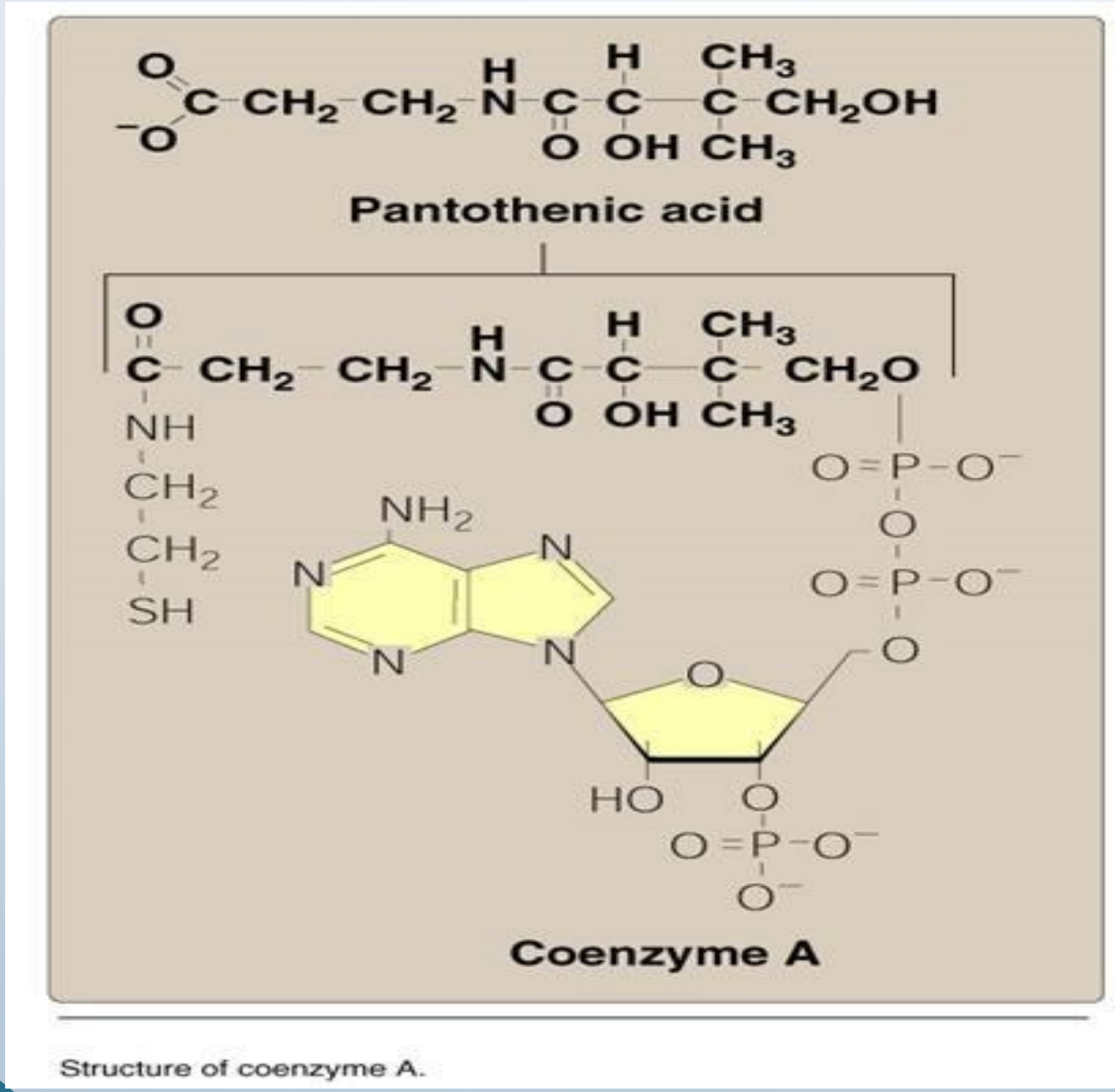
- Function: As nicotinic acid or nicotinamide it is a precursor for the coenzymes NAD and NADP.
- Effect of Deficiency: Pellagra (dermatitis, diarrhea, dementia and if severe, death)
- - Oral manifestations: Angular cheilosis, glossitis, ulcerative glossitis
- Sources: Legumes, meat
- RDA: 19 mg/day



Structure and biosynthesis of NAD^+ and $NADP^+$.

PANTOTHENIC ACID

- Function: Pantothenic acid is a precursor of pantotheine. This structure forms part of coenzyme A.
- Effect of Deficiency: A deficiency is practically unknown. There may be nausea and fatigue.
- Sources: Pantothenic acid is widely distributed and is synthesized by some intestinal bacteria
- RDA: An RDA has not been established. 5-10 mg/ day might be used.



Structure of coenzyme A.

MINERALS

- Minerals are inorganic elements needed for the functioning of the body
- They make up about 4% of body weight of adults, they cannot be changed or broken down
- Some which are needed in high quantities are referred to as macro-elements, examples include Na, K, Mg, Cl etc.
- Others are needed in smaller quantities and are termed microelements, they include Fe, Cu, F, I etc.

MACRO-ELEMENTS

- The body requires relatively large amounts of about 7 minerals (macro-elements)

1 Calcium (Ca)

2 Phosphorus (P)

3 Sulphur

4 Magnesium

5 potassium

6 Chlorine

7 Sodium

MINERALS

- Calcium
- Chromium
- Folate
- Iron
- Magnesium
- Selenium
- Zinc
- Selenium
- Phosphorus
- Sodium
- Potassium
- Chloride
- Sulfur
- Copper
- Iodine
- Cobalt
- Fluoride