1. Adenine Nucleotides and Related Nucleoside Triphosphates
   a. Adenosine 5’-Triphosphate (ATP)
   b. GTP, CTP, UTP
2. Pyridine Nucleotides
   a. Nicotinamide Adenine Dinucleotide (NAD⁺)

   ![Chemical Structure of NAD⁺](image)

   b. Nicotinamide Adenine Dinucleotide Phosphate (NADP⁺) has a third phosphate group attached to the 2’ of the adenine ribose.

   ![Chemical Structure of NADP⁺](image)

   *derived from the B-vitamin nicotinic acid or niacin*
3. Flavin Nucleotides
   a. Flavin Mononucleotide (FMN: Riboflavin monophosphate)
   b. Flavin Adenine Dinucleotide (FAD)
4. Thiamine Pyrophosphate (TPP)
5. Lipoic Acid (thioctic acid; 6,8 - dithio-octanoic acid)
6. Pantothenic acid derivative
   a. AcetylCoenzyme A (CoASAc)

   ![Diagram of CoASAc]

   Contains:
   - 3 esters
   - 2 amides
   - 1 anhydride
   - 1 amine
   - 1 alcohol
   - 1 thiol
7. Pyridoxine acid
Vitamin B₆

Pyridoxine

Pyridoxamine phosphate

Pyridoxal phosphate (PLP)

Amino acid

PLP

-HOH
8. Biotin ("active CO$_2$")
9. Folic Acid

a. folic acid

b. tetrahydrofolic acid FH₄

PABA necessary to complete synthesis of folic acid
Folic acid necessary for last step in Thymine synthesis, therefore, stops DNA production in bacteria