

Vitamin	Name	Solubility	Basic Ring	Co-Enzyme	Function	Deficiency symptom
A	-----	Fat Soluble	β -ionone ring	-----	<ul style="list-style-type: none"> Regulates the protein synthesis and thus are involved in the cell growth and differentiation. Vitamin A is essential to maintain healthy epithelial tissue. Carotenoids (most important β-carotene) function as antioxidants and reduce the risk of cancers initiated by free radicals and strong oxidant. Cholesterol synthesis requires vitamin A. 	<ul style="list-style-type: none"> Night blindness (nyctalopia) Xerophthalmia
D	-----		Steroid	-----	<ul style="list-style-type: none"> Regulates the plasma levels of calcium and phosphate 	rickets in children and osteomalacia in adults
E	-----		6-hydroxy chromane (tocol) ring	-----	<ul style="list-style-type: none"> Membrane antioxidant. It is closely associated with reproductive functions and prevents sterility. It increases the synthesis of 	sterility, degenerative changes, changes in central nervous system

					heme by enhancing the activity of enzymes 6-aminolevulinic acid (ALA) synthase and ALA dehydratase.	
K	-----		Naphthoquinone	-----	<ul style="list-style-type: none"> Synthesis of clotting factors by acting as co-enzyme for carboxylation of glutamic acid. 	The blood clotting time is increased
C	Ascorbic acid	Water Soluble	Resembles monosaccharides	-----	<ul style="list-style-type: none"> Collagen formation Bone formation Metabolism of Tryptophan, Tyrosine, heme, haemoglobin and folic acid. 	Scurvy
B1	Thiamine		Pyrimidine ring and a thiazole ring held by a methylene bridge	Thiamine Pyrophosphate (TPP)	<ul style="list-style-type: none"> Transketolase is dependent on the TPP in HMP shunt pathway. Enzyme pyruvate dehydrogenase catalyses (oxidative carboxylation) the irreversible conversion of pyruvate to acetyl CoA. TPP plays an important role in the transmission of nerve 	Beri-beri

B2	Riboflavin		Isoalloxazine ring attached to D-ribose by a nitrogen atom.	Flavin mononucleotide (FMN) and flavin adenine dinucleotide (FAD)	<p>impulse</p> <ul style="list-style-type: none"> • Redox reactions responsible for energy production • The coenzymes, FAD and FMN are associated with certain enzymes involved in carbohydrate, lipid, protein and purine metabolism and in electron transport chain. 	cheilosis (fissures at the corners of the mouth), glossitis (tongue smooth and purplish) and dermatitis
B3	Nicotine		Pyridine derivative	Nicotinamide adenine dinucleotide (NAD ⁺) and nicotinamide adenine dinucleotide phosphate (NADP ⁺)"	<ul style="list-style-type: none"> • The coenzymes NAD⁺ and NADP⁺ are involved in a variety of oxidation-reduction reactions. • NADH produced is oxidized in the electron transport chain for generation of ATP. 	Pellagra The symptoms of pellagra are commonly referred to as three Ds. The disease also progresses in that order dermatitis, diarrhoea, dementia
B5	Pantothenic acid		Pantoic acid and β-alanine, held together by a peptide linkage	Co-enzyme A (CoA)	<ul style="list-style-type: none"> • Coenzyme A serves as a carrier of activated acetyl or acyl groups. • Coenzyme A is a central molecule involved in all the metabolisms (carbohydrate, lipid and protein). 	burning feet syndrome (Pain and numbness in the toes, sleeplessness, fatigue etc.)

				<ul style="list-style-type: none"> Pantothenic acid itself is a component of fatty acid synthase complex and is involved in the formation of fatty acids. 		
B6	Pyridoxine		Pyridine	Pyridoxal Phosphate(PLP)	<ul style="list-style-type: none"> Pyridoxal phosphate participates in reactions like transamination, decarboxylation, deamination, transsulfuration 	<ul style="list-style-type: none"> neurological symptoms decreased synthesis of biogenic amines serotonin, GABA, norepinephrine and epinephrine
B7	Biotin		Fusion of imidazole and thiophene rings		<ul style="list-style-type: none"> Biotin serves as a carrier of CO₂ in carboxylation reactions 	anemia, loss of appetite, nausea, dermatitis glossitis
B9	Folic acid		Components pteridine ring, p-amino benzoic acid (PABA) and Glutamic acid	Tetrahydrofolate (THF)	<ul style="list-style-type: none"> THF the coenzyme of folic acid, is actively involved in the one carbon metabolism. THF serves as an acceptor or donor of one carbon units (formyl, methyl etc.) in a variety of reactions involving in synthesis of purine, pyrimidine and various amino acid. 	The macrocytic anemia (abnormally large RBC) associated with megaloblastic changes in bone marrow is a characteristic feature of folate deficiency

B12	Cyanocobalamin		The corrin ring has four pyrrole units, just like a porphyrin	Methylcobalamin; Deoxyadenosyl cobalamin	<ul style="list-style-type: none"> • Isomerization of methymalonyl CoA to succinyl CoA. • Synthesis of methionine from homocysteine. 	Pernicious anaemia
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