1. What is coenzyme

A coenzyme is a substance that works with an enzyme to initiate or aid the function of the enzyme. Coenzymes are nonprotein organic molecules that bind loosely to an enzyme. It can be considered a helper molecule for a biochemical reaction. Coenzymes are small, nonproteinaceous molecules that provide a transfer site for a functioning enzyme. They are intermediate carriers of an atom or group of atoms, allowing a reaction to occur. Coenzymes are not considered part of an enzyme's structure. Many (not all) are vitamins or are derived from vitamins. Many coenzymes contain adenosine monophosphate (AMP). Coenzymes may be described as either cosubstrates or prosthetic groups. Coenzymes cannot function on their own and require the presence of an enzyme. Some enzymes require several coenzymes and cofactors. Examples are;

* The B vitamins serve as coenzymes essential for enzymes to form fats, carbohydrates, and proteins.
* An example of a nonvitamin coenzyme is S-adenosyl methionine, which transfers a methyl group in bacteria as well as in eukaryotes and archaea.

A coenzyme binds to a protein molecule (the apoenzyme) to form an active enzyme (the holoenzyme).

2. Differences between fat soluble vitamins and water soluble vitamins

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| Fat Soluble Vitamins | Water Soluble Vitamins |
| These are only soluble in lipids and not water. | These are only soluble in water. |
| Fat soluble are mainly plants in origin e.g. green leafy vegetables. | Water soluble is mainly animal in origin e.g. red meat and liver. |
| Fat soluble vitamins have the ability to get stored in the body for latter requirements. Once they reach intestines, they get dissolved into fats in the form of globules. From there, these are transported to blood stream and finally stored in body tissues.  | Water soluble vitamins cannot be stored in the body for long term. They are not deposited in body tissues |
| Fat soluble vitamins are heat resistant and are not easily destroyed by heat. | Water soluble vitamins are heat labile and are normally destroyed during cooking. |
| Fat soluble are not excreted in urine. | Water soluble are excreted in urine |
| Manifestations of deficiency in fat soluble vitamins are late because of storage in liver. Their deficiencies results in skin diseases, bones diseases, sterility and bleeding respectively. | Water soluble vitamin deficiency appears early. Their deficiency results in anemia and scurvy. |
| Fat soluble vitamin deficiency requires a large dose of vitamin. | Water soluble deficiency requires regular intake of deficient vitamin. |
| Fat soluble vitamins are toxic if taken in excess resulting in ‘hypervitaminosis’ | Water soluble vitamins are unlikely to cause toxicity. |
| These include vitamin A, D, E and K.  | These include all eight forms of vitamin B and Vitamin C. |

3. Niacin

Niacin, also called nicotinamide, serves as a precursor to two coenzymes that are hydrogen carriers in the glycolysis, Kreb's cycle and oxidative phosphorylation metabolic processes that provide energy to the body. Niacin occurs in meats, leafy green vegetables, potatoes and peanuts. Your body can also make small amounts of niacin from the amino acid tryptophan.