ANTIOXIDANTS. CHEMICAL MECANISMS

Authors: Nerea M. P., Arianna P.

1. REACTION OF OXIDATION AND REDUCTION

Redox (reaction of oxidation and reduction) are reactions in which two chemical elements change their number of oxidation (one rases the number of oxidation and the other decreeses it)

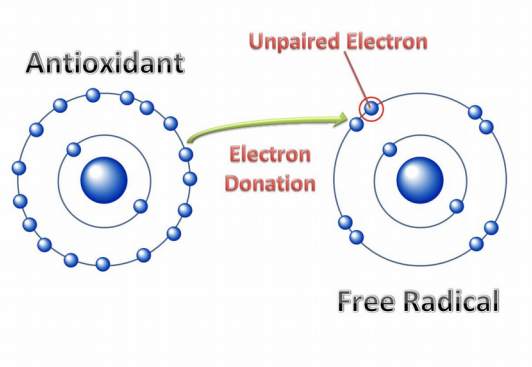
The most important thing that happens in these reactions is that there's an exchange of electrons from an element (reducing) to another (oxidant)

The chemical compounds that are reduced are also called free radicals.

2.WHAT IS AN ANTIOXIDANT

Is a chemical substance that can lend protons or an unpayed electron, so it inhibits oxidation.

They are complex molecules that can be found in nature or synthesize in laboratories.



3. OXIDANTS IN OUR BODY.

Redox reactions are common and vital to some of the basic functions of life, including photosystesis, cell respiration and inflamation processes.

Normally they are keep under control by enzymatic systems and molecular systems as vitamin C, E and albumin. If these molecules don't work properly, oxidation reaction can give a result of oxidative stress. That is caused because of the free radicals that reduces the lipids that the cell membrane contains producing the possible destruction of the cell.

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4.RADICAL CHAIN REACTION.

- Induction: reactive compound (hydropreioxid) attacs another molecule stealing the proton. After this process, the molecule becomes a free radical one.

-Propagation: the new free radical created more and more radicals

- Termination: free radical turn into a stable compound. The reaction ends.

ROO^* : free radical
AH : antioxidant
$R\text{-}CH_2\text{-}CH{=}CH\text{-}CH_2\text{-}R$: unsaturated fat acid

The free radical steals a proton from a fat acid.
$R\text{-}CH_2\text{-}CH{=}CH\text{-}CH_2\text{-}R + ROO^* \rightarrow \underline{R\text{-}CH^*\text{-}CH{=}CH\text{-}CH_2\text{-}R} + ROOH$

The fat acid reacts with the oxigen to create a new free radical:
$R\text{-}CH^*\text{-}CH{=}CH\text{-}CH_2\text{-}R + O_2 \rightarrow R\text{-}CHOO^*\text{-}CH{=}CH\text{-}CH_2\text{-}R$

The new free radical steals a proton from another fat acid:
$R\text{-}CHOO^*\text{-}CH{=}CH\text{-}CH_2\text{-}R + R\text{-}CH_2\text{-}CH{=}CH\text{-}CH_2\text{-}R \rightarrow$
$R\text{-}CHOOH\text{-}CH{=}CH\text{-}CH_2\text{-}R + \underline{R\text{-}CH^*\text{-}CH{=}CH\text{-}CH_2\text{-}R}$
Stable molecule Free radical that continues the reaction.

With the action of the antioxidant:
$ROO^* + AH \rightarrow ROOH + A^*$
$A^* + A^* \rightarrow AA$
Two antioxidant react together to create a stable compound, the reaction stops.

5. NATURAL ANTIOXIDANTS

This natural antioxidant (polyphenols) can be found in the food we eat.

1. -Phenolic acid : gallic, tyrosol.
2. -Flavonoids: produced by the secondary metabolism of plants.
3. - Isoflavons: in legums.
4. -Anthocyanins : in red fruit and berries.
5. - Stilbens: resveratrol, in red wine.

They prevent us from vascular deseases that are rapid absorbed and metabolised and they add antioxidants and antimicrobiotic activity.

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