



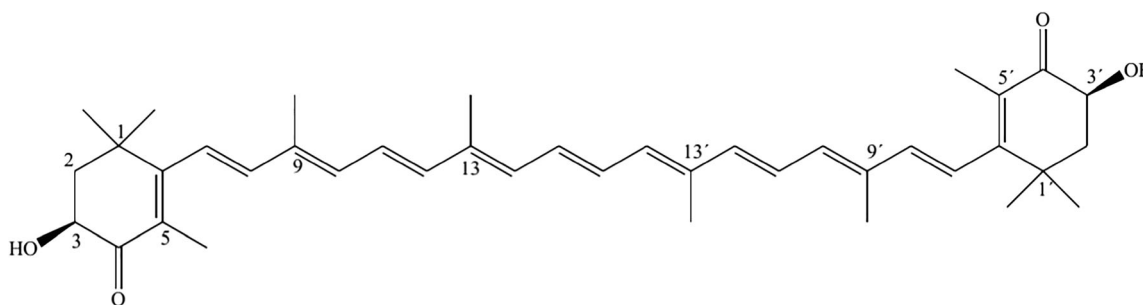
Is astaxanthin similar to ubiquinone?

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Carotenoids are a widespread group of natural pigments. Their molecular structure is dominated by extensive system of conjugated double bonds that serves as the light-absorbing chromophore [1]. These compounds are impor-

tant nutrients that prevent oxidative damage. Among them, the strongest antioxidant is astaxanthin that is characterized by two conjugated carbonyl groups, as can be seen in the figure.



Astaxanthin is not soluble in water, but its electrode reactions can be measured in aqueous electrolyte if the electrode is prepared by its precipitate from acetone solution and immersed into the cell [2]. In square wave voltammetry starting from -0.5 V vs. Ag/AgCl towards higher potentials, the response consists of three peaks, and the first one appears at -0.345 V. It is caused by the reversible reduction of carbonyl groups to hydroxyl groups: $\text{Ast} + 2e^- + 2\text{H}^+ \leftrightarrow \text{H}_2\text{Ast}$. With the regards to this reaction, astaxanthin is similar to biquinones. The latter are physiologically active compounds playing fundamental roles in oxidative phosphorylation and mitochondrial electron transfer processes [3]. Their reduced

forms are good antioxidants. The reduction of astaxanthin in nature has not yet been observed, but it may occur in the scavenging of superoxide anion radicals [4]. In the further investigation of electrochemistry of astaxanthin and similar compounds, the reduction of carbonyl groups should be explored in more details with respect to its possible role in biological processes.

References

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