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ProductInformation

Astaxanthin

Product Number **A 9335**
Storage Temperature -0 °C

Product Description
Molecular Formula: $C_{40}H_{52}O_4$
Molecular Weight: 596.9
Melting point: 182 °C[1]
CAS Number: 472-61-7

This product is a naturally occurring carotenoid pigment and is a powerful biological antioxidant.[2,3] It is a member of a select group of carotenoids known as xanthophylls, or oxygenated carotenoids. Xanthophylls are some of the most active carotenoids and astaxanthin is the most active xanthophylls. It exhibits strong, free-radical scavenging activity[4] and protects against lipid peroxidation and oxidative damage of LDL-cholesterol[5], cell membranes, cells, and tissues.

This product has a molecular structure similar to that of β-carotene. However, this product has thirteen conjugated double bonds (in contrast to eleven in β-carotene), which gives it significantly greater antioxidant capacity than β-carotene. In addition, this product has carboxyl groups within each cyclohexene ring that significantly increase its antioxidant activity and hydroxyl groups in the 3 and 3' positions, making the molecule highly polar and dramatically enhancing its membrane function activity to protect against degenerative conditions. This is not found in other antioxidants. Because of this structure, this product will:

1. Span the cell membrane bilayer because of its polar end groups, allowing it to sit near the lipid/water interface, where free radical attack first occurs and contributing to cell membrane rigidity and mechanical strength.[6]
2. Cross the blood-brain barrier.
3. Inhibit the destruction of the fatty acids and proteins in cell membranes and mitochondrial membranes in cells caused by peroxidation of fats.[5]
4. Stabilize free radicals by adding them to its structure (long double-bond chain) rather than donating an atom or electron to the radical.
5. Resist the chain reactions that can occur when a fatty acid is oxidized, thus allowing it to scavenge or quench longer than an antioxidant that cannot stop this chain reaction.
6. Trap more types of radicals (alkoxyl, hydroxyl, peroxyl, singlet and triplet oxygen) than any other antioxidant.
7. Travel more readily in the body and is more bioavailable, since it binds to lipoproteins.
8. Inhibit reactive oxygen species that cause cellular inflammation, thus having anti-inflammatory capabilities.
9. Transport alkoxyl radicals along its long chain (like a bridge) to the lipid/water interface, where an antioxidant such as vitamin C can scavenge it. It has also been shown to have antitumor activity[7,8] and immune system enhancement capabilities.[9,10]

This product is synthetic.

Precautions and Disclaimer
For Laboratory Use Only. Not for drug, household or other uses.

Preparation Instructions
This product is soluble in chloroform (5 mg/ml). It is also readily soluble in pyridine from which it can be crystallized by addition of some water.[1] It is soluble in DMSO (50 mg/ml) with the application of heat, yielding a clear, dark red solution.

Storage/Stability
No solution stability information is given, but the solid (and solutions) should be protected from light and stored under argon.

References

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5. Murillo, E., Hypercholesterolemic effect of canthaxanthin and astaxanthin in rats., Arch. Latinoam. Nutr., **42(4)**, 409-13 (1992).
6. Kurashige, M., et al. Inhibition of oxidative injury of biological membranes by astaxanthin. Physiol. Chem. Phys. Med. NMR, **22(1)**, 27-38 (1990).
7. Jyonouchi, H., et al. Antitumor activity of astaxanthin and its mode of action. Nutr. Cancer, **36(1)**, 59-65 (2000).
8. Chew, B.P., et al. A comparison of the anticancer activities of dietary beta-carotene, canthaxanthin and astaxanthin in mice in vivo. Anticancer Res., **19(3A)**, 1849-53 (1999).
9. Thompson, I., et al. The effect of dietary vitamin A and astaxanthin on the immunocompetence of rainbow trout. Aquaculture **133**, 91-102 (1995).
10. Jyonouchi, H., et al. Astaxanthin, a carotenoid without vitamin A activity, augments antibody responses in cultures including T-helper cell clones and suboptimal doses of antigen. J. Nutr., **125(10)**, 2483-92 (1995).

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