

Light induced degradation of norbixin in aqueous solution

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Introduction:

Norbixin is a carotenoid extracted from the seeds of the Annatto plant (*Bixa orellana*) and widely used as a natural colorant in pharmaceuticals, cosmetics and foods. Norbixin contains two carboxylic acids making it more hydrophilic than most other carotenoids enabling the use of norbixin in food applications where other carotenoids lacks aqueous solubility. However, the stability of norbixin in aqueous solution and the mechanism behind the degradation of norbixin have not been fully elucidated. The objective of the presented work was to investigate the effect of light on the stability of norbixin and to gain insight into the mechanism behind the light induced degradation of norbixin in aqueous solution.

Methods:

Samples of norbixin in aqueous solution was stored in light or dark for different time intervals and analysed using absorbance spectroscopy and high-resolution LC-MS. Compounds related to the oxidation of norbixin was further analysed using LC-MS/MS.

Results and discussion:

The LC-MS analysis resulted in the detection of a number of compounds with masses equal to oxidized norbixin species containing one or more oxidations. MS/MS analysis of the compounds confirmed that the compounds are related to norbixin in structure and likely to be oxidized norbixin. The analysis also revealed that the levels of the oxidized norbixin species detected depended on storage time and that the formation of oxidized norbixin species was accelerated by light. The detection of norbixin containing several oxidations have not previously been reported and might be important for understanding the mechanism behind the light induced degradation of norbixin.

Conclusion:

Storage of norbixin leads to formation of oxidized norbixin species and the oxidation is accelerated by light.