Zeaxanthin in Soybean oil: impact of oxidative stability, degradation pattern and product analysis

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Summary of Figures and tables in Supporting Information:

Table S1. Pearson correlation and regression models coefficients relating the stability indexes, Y=peroxide value (mmol/kg), to the zeaxanthin content, X (μg/g), in soybean oil.

Table S2. Reaction rate constant (k) and correlation of coefficient (R^2) of three kinetic models of all-E-zeaxanthin in soybean oil at isothermal condition (110°C).

Table S3. Zeaxanthin-thermodegraded compounds that tentatively identified in soybean oil.

Figure S1. Possible routes for the formation of 6-methyl-3,5-heptadien-2-one, 3-hydroxy-5,6-epoxy-7,8-dihydro-β-ionone, 3-hydroxy-β-ionone and 3-hydroxy-β-cyclocitral, from the Zeaxanthin.

Table S1.

Sample	10（μg/g）	50（μg/g）	100（μg/g）	200（μg/g）	400（μg/g）
Pearson correlation coefficient	-0.954	-0.981	-0.988	-0.960	-0.995
p-value	0.003	0.012	0.024	0.005	0.028
Regression model	Y = -4.3886*X + 47.315	Y= -0.9936*X + 43.217	Y = -0.5726*X + 56.95	Y= -0.2368*X + 50.543	Y= -0.1137*X + 48.923
R^2	0.922	0.964	0.980	0.918	0.990

Table S2.

Zeaxanthin	Zero-order reaction[a]		The 1st-order reaction[b]		The 2nd-order reaction[c]	
	k/(h^{-1}) (R^2)					
	k	R^2	k	R^2	k	R^2
10 μg/g	0.7033	0.9275	0.1460	0.9383	0.0372	0.8273
50 μg/g	3.1206	0.9319	0.1404	0.9482	0.0077	0.8633
100 μg/g	6.7028	0.9453	0.1325	0.9609	0.0031	0.8686
200 μg/g	13.569	0.9521	0.1451	0.9609	0.0019	0.8603
400 μg/g	27.9400	0.9805	0.1470	0.9814	0.0009	0.8910

a $C_A - C_{A,0} = -k\mathrm{t}$

b $\ln (C_A/C_{A,0}) = -k\mathrm{t}$

c $\frac{1}{C_A - C_{A,0}} = k\mathrm{t}$

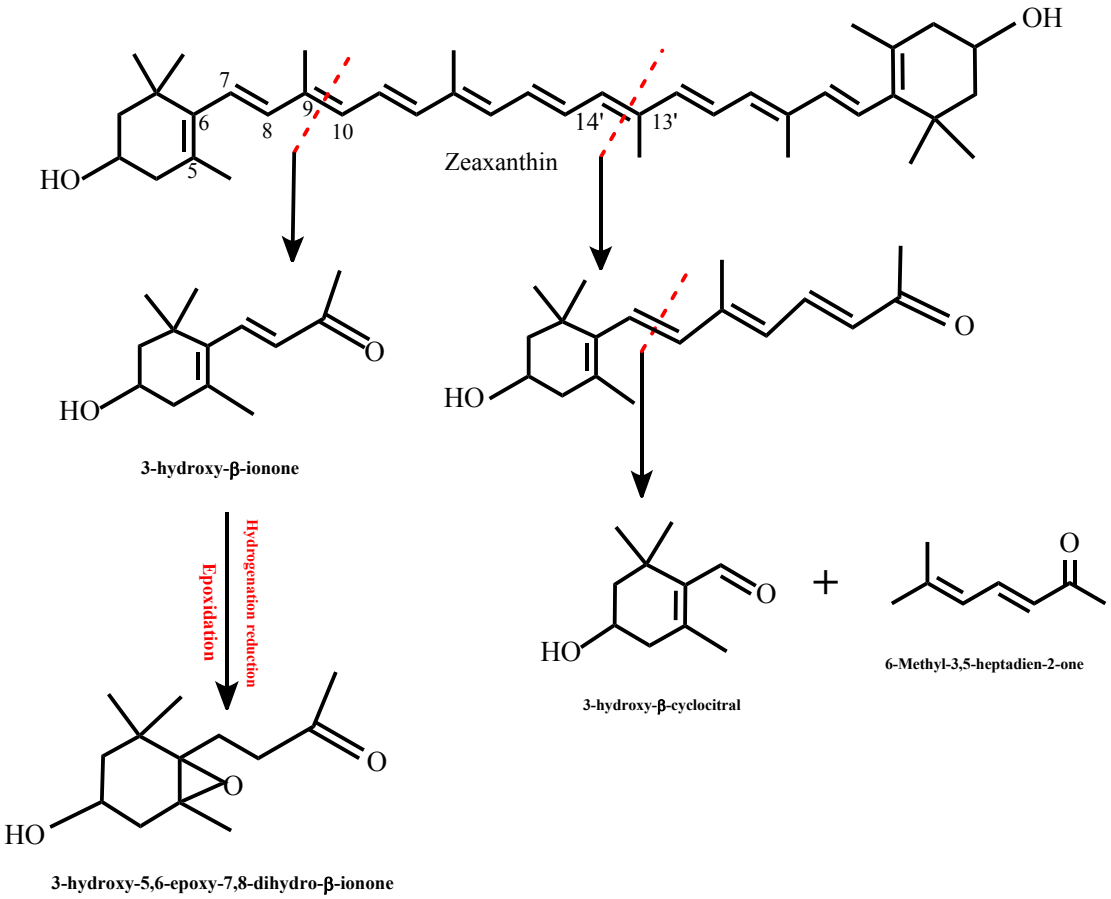
where C_A was the zeaxanthin concentration at time t and $C_{A,0}$ was the initial zeaxanthin concentration, and the reaction rate constants k were based on linear regression.

Table S3.

peak	compounds	relative percentage (%)[a]
1	6-methyl- 3,5-heptadien-2-one	1.77
2	3-hydroxy-5,6-epoxy-7,8-dihydro-β-ionone	0.49
3	3-hydroxy-β-ionone	0.35
4	3-hydroxy-β-cyclocitral	1.02

[a] Data are expressed as percentage values with respect to the total volatile profile.

Figure S1.


OH
HO
7
6
5
8
9
10
14'
13'
Zeaxanthin
O
HO
3-hydroxy-β-ionone
O
HO
3-hydroxy-β-cyclocitral
+
O
6-Methyl-3,5-heptadien-2-one
Epoxidation
Hydrogenation reduction
O
O
HO
3-hydroxy-5,6-epoxy-7,8-dihydro-β-ionone