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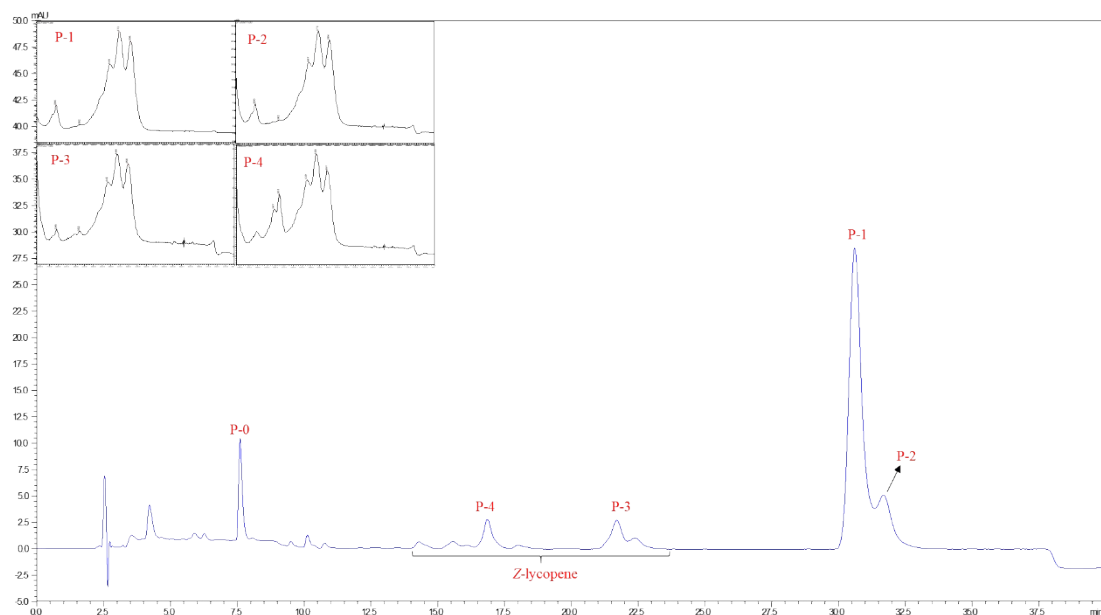


Fig. S1 Representative chromatogram of carotenoids profile at 472 nm for tomato-onion-EVOO sauces (P-0: internal standard; P-1: all-*E*-lycopene; P-2: 5-*Z*-lycopene; P-3: 9-*Z*-lycopene; P-4: 13-*Z*-lycopene)

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Table S1. Identification of lycopene isomers.

Peaks	Lycopene isomers	K'	$\lambda_{\text{max}}$ (in line)(nm)	Q-ratios (inline)	Q-ratios (reported)		
P-1	all- <i>E</i> -	11.962	446,473,504	0.06	0.12 <sup>a</sup>	0.06 <sup>c</sup>	n.d.
P-2	5- <i>Z</i> -	12.437	362,447,473,504	0.06	0.11 <sup>a</sup>	0.05 <sup>b</sup>	n.d.
P-3	9- <i>Z</i> -	8.229	362,442,468,498	0.13	0.20 <sup>a</sup>	0.12 <sup>b</sup>	0.13 <sup>d</sup>
P-4	13- <i>Z</i> -	6.173	361,439,464,496	0.58	0.52 <sup>a</sup>	0.55 <sup>b</sup>	0.56 <sup>d</sup>

K': retention index of peaks;

Q-ratio: the ratio of absorption intensity ( $D_B$ ) at the near-UV maxima (36 to 362 nm) to absorption intensity ( $D_H$ ) at the main absorption maximum (45 to 476 nm);

<sup>a, b, c, d</sup> Identified according to previous work in references (<sup>a</sup> Sun, et al. 2016; <sup>b</sup> Lin, et al. 2003; <sup>c</sup> Schierle, et al. 1997; <sup>d</sup> K. Murakami et al. 2018).

n.d.: not detected

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56 Table S2: Experimental results of yield (%), dry weight (%) and content of lycopene isomers per dry  
57 weight of product (mg/kg DW) in HB-O-E sauce for each formulation

RUN	Yield	Dry weight	13-Z	9-Z	5-Z	total-Z	all-E	total
1	86.6	11.0±0.2	17.4±1.9	24.0±0.8	59.2±3.9	122±6	518±25	640±19
2	84.6	12.2±0.2	18.8±0.2	22.7±0.9	48.5±5.5	110±7	431±17	541±24
3	82.3	12.0±0.1	21.2±1.5	21.8±1.0	52.0±5.3	115±7	378±3	493±6
4	85.6	12.6±0.1	21.9±0.8	25.3±2.9	58.4±3.6	129±5	357±11	486±12
5	84.8	13.6±0.1	21.1±0.5	19.8±0.8	44.6±4.6	104±4	413±7	517±3
6	82.3	14.2±0.1	19.1±0.9	21.9±0.9	53.8±10.5	114±11	371±15	485±10
7	84.0	13.8±0.1	19.1±1.1	22.1±2.6	53.4±6.0	116±1	333±3	448±3
8	84.7	13.7±0.1	19.3±0.9	20.3±0.6	54.6±6.5	114±7	330±2	444±5
9	84.9	13.6±0.1	20.1±0.2	22.6±3.6	56.6±1.6	121±6	324±8	445±6
10	85.2	13.8±0.2	20.9±0.9	20.7±3.9	53.3±3.2	116±6	269±16	385±20
11	82.2	15.2±0.23	20.0±1.1	25.1±0.5	57.4±6.7	127±8	295±4	421±4
12	83.5	15.0±0.1	19.3±1.2	21.9±3.1	53.9±3.9	118±7	264±9	382±1
13	84.0	16.2±0.3	17.2±0.8	15.8±0.7	38.1±4.3	86±6	326±16	412±11
14	83.0	16.6±0.3	17.9±1.2	21.2±1.3	50.2±3.7	110±6	214±5	324±6

58 HB-O-E: hot-break tomato puree-onion puree-extra virgin olive oil

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75 Table S3: Experimental results of yield (%), dry weight (%) and content of lycopene isomers per dry  
76 weight of product (mg/kg DW) in CB-O-E sauce for each formulation

RUN	Yield	Dry weight	13-Z	9-Z	5-Z	total-Z	all-E	total
1	85.2	10.5±0.1	44.2±4.2	44.9±1.1	166±13	297±11	1660±60	1957±51
2	84.3	11.4±0.1	42.5±5.1	41.7±5.5	151±13	272±29	1339±41	1612±14
3	82.3	11.4±0.1	41.5±3.5	41.7±0.8	132±16	253±13	1194±42	1447±54
4	85.1	12.3±0.3	51.3±1.6	49.2±5.4	172±24	324±15	1043±26	1367±16
5	85.5	13.0±0.3	55.6±2.8	35.1±2.9	111±25	243±31	1202±13	1446±19
6	84.5	13.3±0.1	48.2±3.7	49.0±3.6	157±38	305±33	1087±4	1392±35
7	84.7	13.1±0.1	48.4±5.0	50.1±4.4	166±36	316±33	1006±15	1322±32
8	84.7	13.2±0.2	52.4±2.8	48.8±4.1	174±12	327±3	1005±48	1331±46
9	84.0	13.3±0.1	52.5±7.3	50.3±4.5	178±20	334±17	971±13	1304±12
10	83.9	13.4±0.2	49.9±2.0	45.5±4.0	149±22	294±15	853±25	1147±12
11	84.6	14.7±0.1	47.9±4.4	45.8±4.6	150±30	292±25	863±29	1155±11
12	84.2	14.7±0.1	49.2±2.4	45.2±5.0	152±15	295±4	814±23	1109±25
13	87.7	15.0±0.1	48.9±4.0	29.5±3.1	100±6	214±4	983±13	1197±13
14	85.9	15.7±0.5	51.6±2.0	41.6±9.0	164±12	304±17	640±13	944±20

77 CB-O-E: cold-break tomato puree-onion puree-extra virgin olive oil

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