

Fig. S1. Linear fit of the experimental data by intermediate blocking model

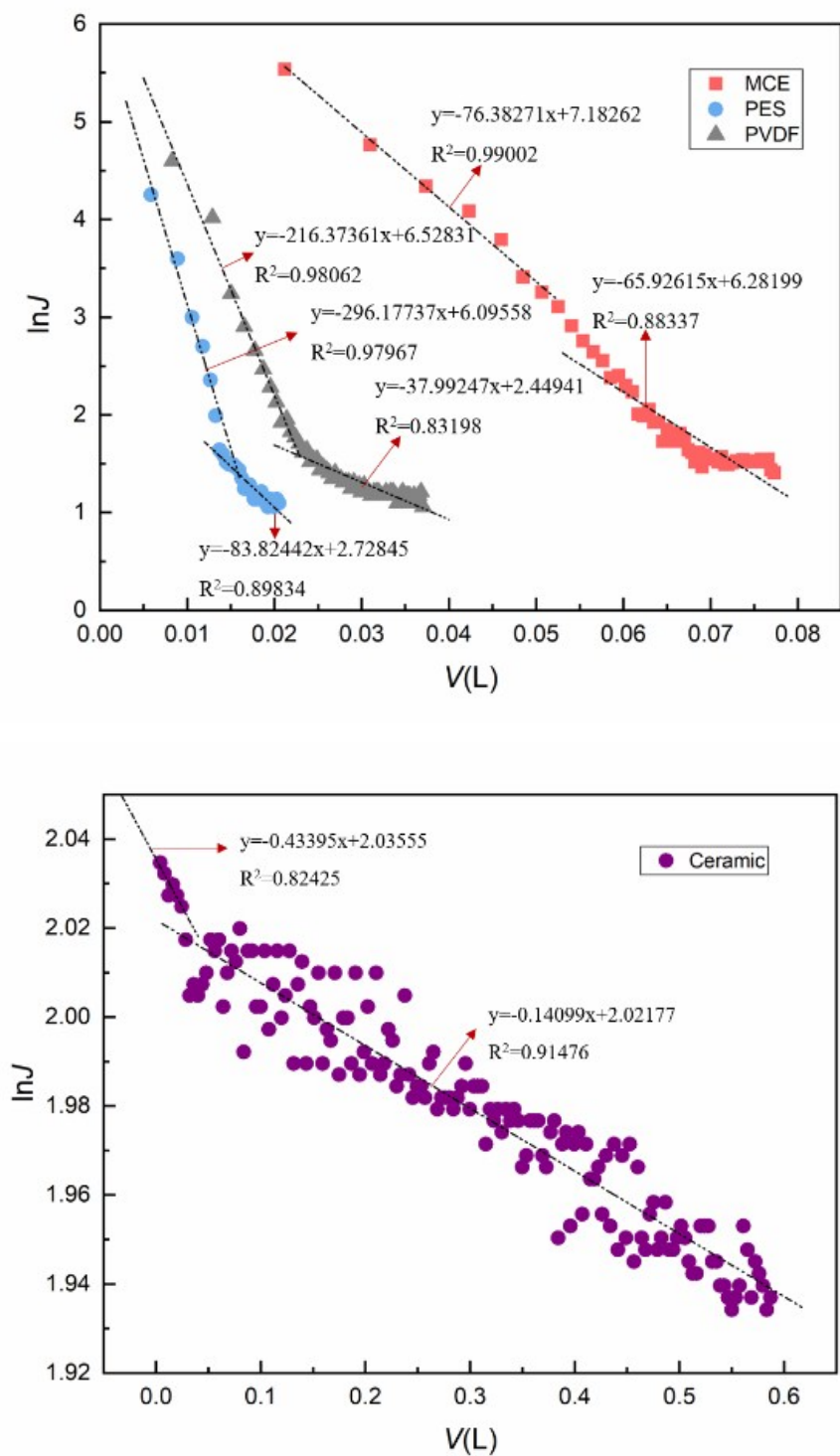


Fig. S2. Linear fit of the experimental data by standard blocking model

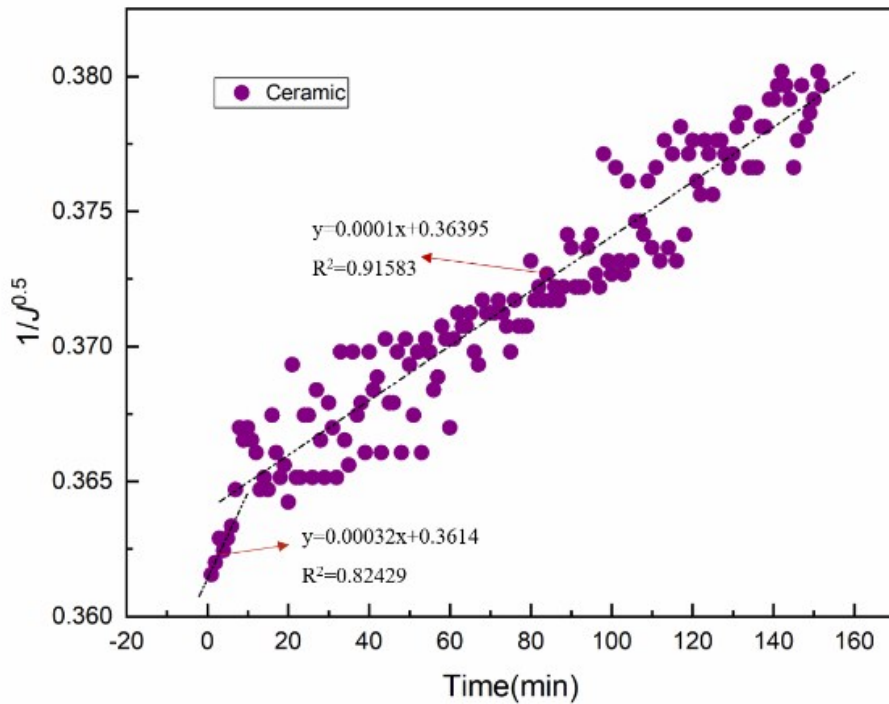
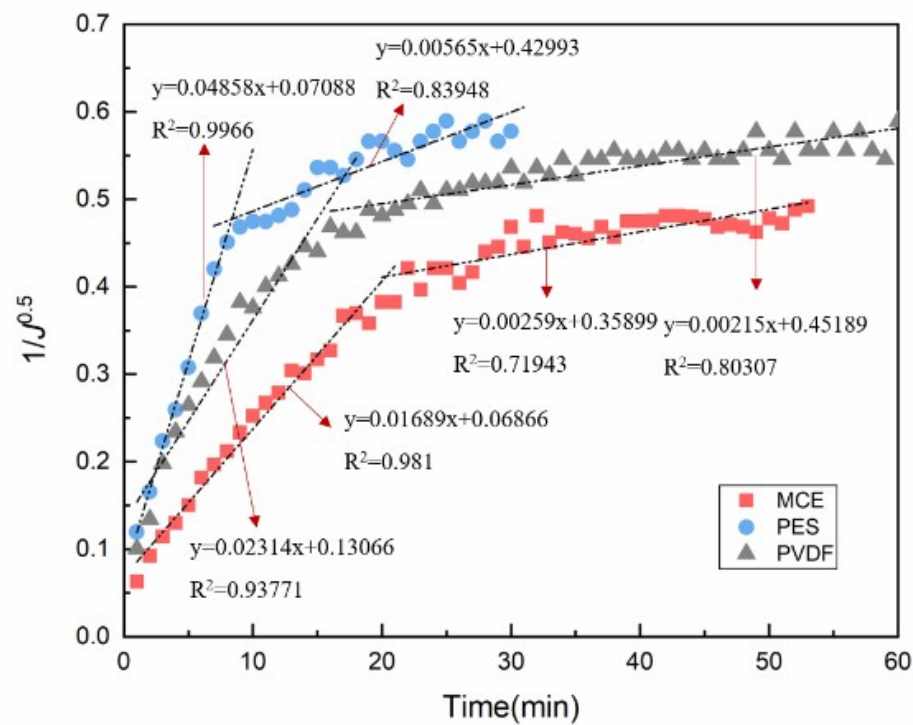


Fig. S3. Linear fit of the experimental data by complete blocking model

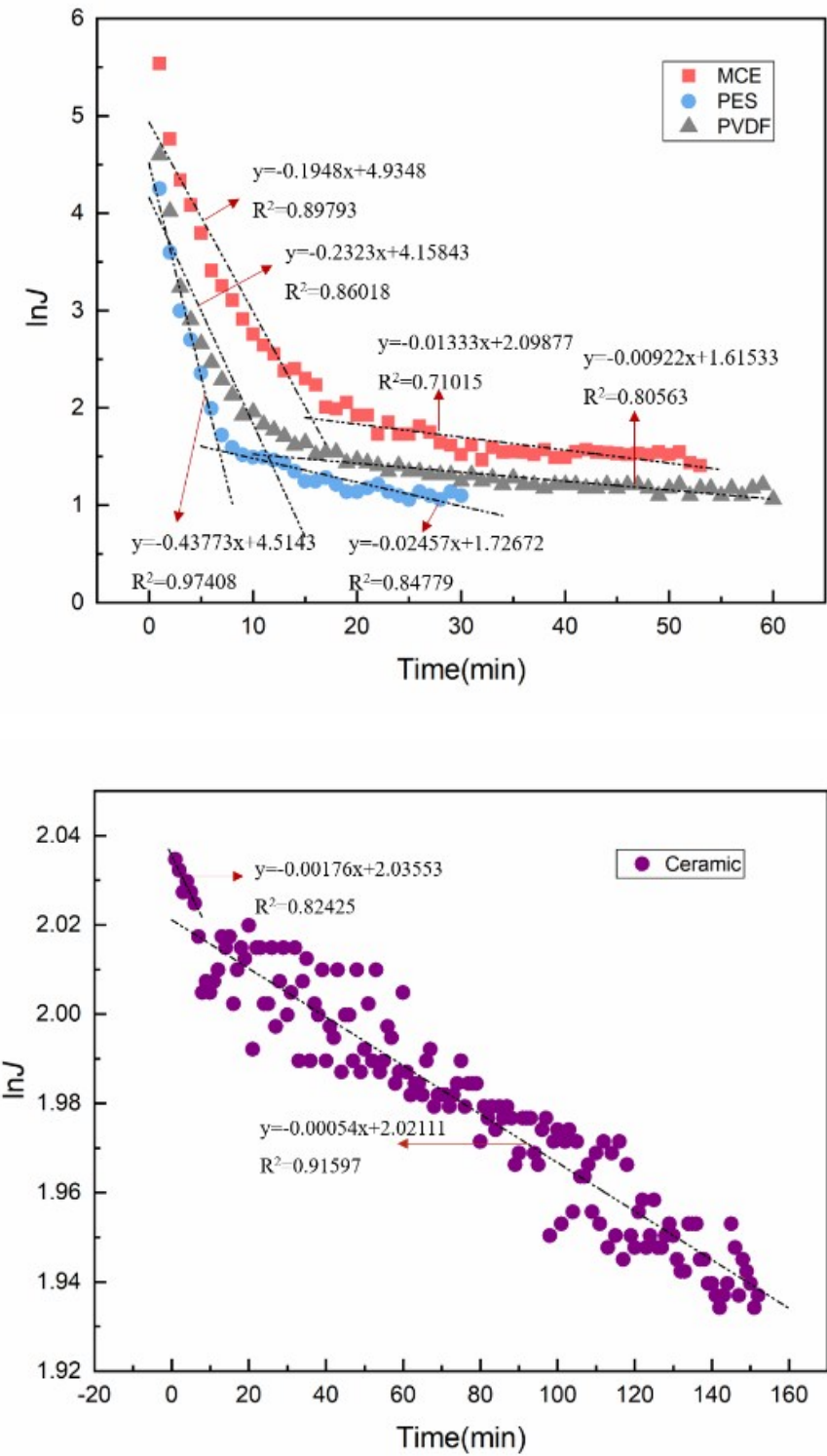


Table S1. Concentration of volatiles in different soy sauce samples

Number	Volatile compounds	Concentrations (means ± standard deviation, µg/L)*					
		Raw soy sauce	Pasteurization	MCE	PES	PVDF	Ceramic
Alcohols							
1	2-methyl-1-propanol	171.41 ± 8.27 ^a	124.72 ± 30.90 ^b	99.42 ± 27.11 ^{bc}	41.22 ± 10.92 ^c	55.72 ± 11.55 ^{de}	81.27 ± 14.79 ^{cd}
2	1-butanol	57.16 ± 4.76 ^a	47.75 ± 14.32 ^a	29.35 ± 6.21 ^b	21.51 ± 6.68 ^b	24.34 ± 2.74 ^b	46.29 ± 14.09 ^a
3	3-methyl-1-butanol	1007.98 ± 90.72 ^a	669.13 ± 100.16 ^b	377.63 ± 68.72 ^c	175.19 ± 30.66 ^d	254.05 ± 14.01 ^d	436.77 ± 39.46 ^c
4	4-methyl-1-pentanol	4.49 ± 0.52 ^a	2.72 ± 0.70 ^b	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
5	1-octen-3-ol	1.05 ± 0.32 ^a	0.47 ± 0.09 ^b	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.29 ± 0.05 ^b
6	3-(methylthio)-1-propanol	386.58 ± 20.24 ^a	280.42 ± 35.30 ^b	207.26 ± 33.20 ^c	205.23 ± 28.93 ^c	241.07 ± 27.11 ^{bc}	272.73 ± 37.86 ^b
7	benzyl alcohol	72.92 ± 5.37 ^a	40.68 ± 3.02 ^b	25.30 ± 1.98 ^d	21.04 ± 3.56 ^d	30.34 ± 0.10 ^{cd}	38.33 ± 10.88 ^{bc}
8	phenylethyl alcohol	7903.13 ± 634.40 ^a	5122.36 ± 453.36 ^b	4038.89 ± 75.09 ^c	3521.66 ± 531.32 ^c	4997.57 ± 326.76 ^b	5711.18 ± 95.08 ^b
9	ethylphenethyl alcohol	353.38 ± 33.34 ^a	210.52 ± 11.62 ^c	93.59 ± 2.60 ^c	94.45 ± 11.70 ^c	150.05 ± 6.75 ^d	265.96 ± 33.96 ^b
10	1-phenyl-cyclopropanemethanol	723.67 ± 58.97 ^a	451.31 ± 41.97 ^b	193.30 ± 26.08 ^d	223.80 ± 36.84 ^d	338.39 ± 44.31 ^c	403.37 ± 40.34 ^{bc}
11	4-(1-methylethoxy)-1-butanol	6.38 ± 2.69 ^b	14.92 ± 3.89 ^a	6.41 ± 2.62 ^b	11.66 ± 3.55 ^{ab}	9.91 ± 3.76 ^{ab}	8.43 ± 1.66 ^b
	total	10688.15 ± 859.62 ^a	6964.99 ± 695.34 ^{bc}	5071.15 ± 243.61 ^d	4315.75 ± 664.15 ^d	6101.44 ± 437.08 ^c	7264.64 ± 288.17 ^b
Aldehydes and ketones							
12	benzaldehyde	93.69 ± 1.46 ^a	106.07 ± 0.92 ^a	107.42 ± 11.81 ^a	106.46 ± 7.74 ^a	88.96 ± 3.41 ^a	106.08 ± 31.09 ^a
13	benzeneacetaldehyde	131.41 ± 7.40 ^a	145.52 ± 6.37 ^a	126.41 ± 23.91 ^a	134.52 ± 11.80 ^a	127.97 ± 13.17 ^a	129.33 ± 25.79 ^a
14	3-hydroxy-2-butanone	24.31 ± 4.31 ^a	17.60 ± 4.74 ^b	16.68 ± 2.25 ^b	14.01 ± 2.31 ^b	16.94 ± 4.30 ^b	12.77 ± 3.64 ^b
15	2-4-dihydroxy-3-methylpropiophenone	4.79 ± 1.28 ^b	7.92 ± 0.24 ^a	0.00 ± 0.00	3.57 ± 1.54 ^{bc}	2.15 ± 1.43 ^c	0.00 ± 0.00
	total	254.19 ± 14.44 ^a	277.10 ± 12.26 ^a	250.51 ± 37.97 ^a	258.55 ± 23.39 ^a	236.02 ± 22.31 ^a	248.18 ± 60.52 ^a
Acids							
16	acetic acid	358.60 ± 30.00 ^a	384.72 ± 15.41 ^a	280.40 ± 22.65 ^b	295.83 ± 9.28 ^b	315.64 ± 24.16 ^b	216.94 ± 5.07 ^c
17	propanoic acid	13.93 ± 0.35 ^{ab}	14.83 ± 2.68 ^a	9.63 ± 2.46 ^c	12.52 ± 2.38 ^{abc}	10.63 ± 1.29 ^{bc}	10.29 ± 0.77 ^c
18	2-methyl-propanoic acid	55.00 ± 5.32 ^a	42.06 ± 0.91 ^b	37.58 ± 2.79 ^b	35.02 ± 5.83 ^b	37.96 ± 3.03 ^b	39.32 ± 3.42 ^b
19	2-methyl-hexanoic acid	196.66 ± 17.09 ^a	128.13 ± 8.73 ^c	143.88 ± 6.13 ^{cd}	118.62 ± 18.31 ^c	137.90 ± 11.87 ^{bc}	163.39 ± 24.28 ^b
20	4-methyl-pentanoic acid	20.58 ± 1.56 ^a	11.10 ± 0.31 ^b	19.85 ± 2.72 ^a	17.49 ± 2.30 ^a	19.99 ± 0.99 ^a	19.38 ± 2.48 ^a

21	hexanoic acid	34.43 ± 2.42 ^a	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
22	n-hexadecanoic acid	22.93 ± 4.11 ^a	9.27 ± 2.36 ^b	10.61 ± 2.00 ^b	10.48 ± 2.34 ^b	9.84 ± 1.19 ^b	7.97 ± 0.63 ^b
	total	702.13 ± 60.86^a	590.12 ± 30.39^b	501.95 ± 38.75^c	489.97 ± 40.44^c	531.96 ± 42.54^b	457.30 ± 36.65^c
Esters							
23	2-hydroxy-propanoic acid, ethyl ester	19.03 ± 1.16 ^a	13.35 ± 1.15 ^b	12.75 ± 1.53 ^b	11.74 ± 2.13 ^b	12.34 ± 1.11 ^b	14.15 ± 0.50 ^b
24	octanoic acid, ethyl ester	30.02 ± 10.51 ^a	3.43 ± 0.71 ^b	9.01 ± 3.13 ^b	8.67 ± 2.14 ^b	9.73 ± 2.23 ^b	6.30 ± 1.25 ^b
25	butanedioic acid, diethyl ester	33.64 ± 4.47 ^a	0.00 ± 0.00	10.01 ± 0.58 ^c	0.00 ± 0.00	0.00 ± 0.00	22.58 ± 3.24 ^b
26	benzeneacetic acid, methyl ester	3.16 ± 0.86 ^a	2.93 ± 0.00 ^a	3.59 ± 1.53 ^a	0.00 ± 0.00	3.16 ± 0.18 ^a	0.00 ± 0.00
27	benzeneacetic acid, ethyl ester	83.48 ± 4.41 ^a	77.17 ± 15.73 ^a	19.77 ± 1.17 ^c	22.25 ± 1.51 ^c	15.96 ± 1.22 ^c	38.56 ± 1.48 ^b
28	acetic acid, 2-phenylethyl ester	247.59 ± 53.12 ^b	338.89 ± 20.23 ^a	5.08 ± 0.66 ^d	5.26 ± 0.49 ^d	19.10 ± 0.43 ^d	165.92 ± 2.08 ^c
29	dodecanoic acid, ethyl ester	29.74 ± 14.02 ^a	7.45 ± 2.95 ^b	2.02 ± 0.47 ^b	0.37 ± 0.00 ^b	0.45 ± 0.08 ^b	2.65 ± 0.00 ^b
30	tetradecanoic acid, ethyl ester	81.32 ± 26.51 ^a	30.15 ± 0.00 ^b	38.38 ± 12.44 ^b	18.20 ± 5.37 ^b	21.79 ± 3.59 ^b	22.53 ± 0.28 ^b
31	pentadecanoic acid, ethyl ester	35.19 ± 15.06 ^a	5.20 ± 2.31 ^b	12.60 ± 3.89 ^b	4.39 ± 2.10 ^b	11.10 ± 1.84 ^b	5.67 ± 2.30 ^b
32	3-phenyl-2-propenoic acid, ethyl ester	9.80 ± 1.42 ^a	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
33	hexadecanoic acid, methyl ester	102.09 ± 41.22 ^a	0.00 ± 0.00	23.04 ± 9.24 ^b	21.62 ± 7.04 ^b	30.62 ± 12.59 ^b	40.71 ± 16.05 ^b
34	hexadecanoic acid, ethyl ester	2375.46 ± 497.35 ^a	404.59 ± 159.17 ^b	34.68 ± 5.04 ^b	39.30 ± 16.02 ^b	25.61 ± 1.82 ^b	62.75 ± 19.56 ^b
35	heptadecanoic acid, ethyl ester	4.70 ± 1.75 ^a	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
36	hexadecanoic acid, 2-methylpropyl ester	5.50 ± 1.89 ^a	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
37	ethyl hydrogen succinate	4.54 ± 0.80 ^b	16.57 ± 6.69 ^a	5.64 ± 1.68 ^b	14.03 ± 3.42 ^a	6.04 ± 0.16 ^b	0.00 ± 0.00
38	15-methyl-heptadecanoic acid, ethyl ester	56.86 ± 8.89 ^a	15.01 ± 6.20 ^b	0.00 ± 0.00	14.34 ± 7.15 ^b	1.65 ± 0.16 ^c	9.09 ± 5.24 ^{bc}
39	ethyl oleate	601.17 ± 74.95 ^a	91.31 ± 39.39 ^b	0.00 ± 0.00	132.49 ± 17.69 ^b	0.00 ± 0.00	0.00 ± 0.00
40	9,12-octadecadienoic acid, ethyl ester	1966.00 ± 415.99 ^a	270.97 ± 0.08 ^b	0.00 ± 0.00	36.77 ± 4.83 ^b	95.15 ± 0.00 ^b	0.00 ± 0.00
41	9,12,15-octadecatrienoic acid, ethyl ester	119.48 ± 33.91 ^a	23.28 ± 12.22 ^b	0.00 ± 0.00	27.22 ± 8.83 ^b	6.24 ± 0.00 ^b	0.00 ± 0.00
42	4-hydroxy-3-methoxy-benzoic acid, ethyl ester	96.30 ± 20.24 ^a	99.22 ± 16.65 ^a	35.74 ± 5.06 ^b	55.84 ± 18.23 ^b	38.06 ± 5.12 ^b	50.60 ± 21.99 ^b
	total	5905.07 ± 1228.54^a	1399.51 ± 283.48^b	212.31 ± 46.41^c	412.50 ± 96.96^c	297.00 ± 30.54^c	441.52 ± 73.99^c
Phenols							
43	2-methoxy-phenol	47.17 ± 4.20 ^a	35.05 ± 2.65 ^{bc}	25.38 ± 5.75 ^d	15.30 ± 1.35 ^e	29.39 ± 3.56 ^{cd}	39.89 ± 7.92 ^{ab}
44	4-ethyl-2-methoxy-phenol	4843.65 ± 401.73 ^a	3648.84 ± 301.98 ^c	898.93 ± 17.11 ^c	1005.15 ± 100.25 ^c	1916.97 ± 74.18 ^d	4121.30 ± 244.68 ^b

45	4-ethyl-phenol	519.71 ± 39.34 ^a	395.64 ± 37.64 ^c	145.13 ± 7.51 ^c	94.75 ± 12.34 ^c	292.44 ± 34.25 ^d	464.16 ± 32.25 ^b
46	2-methoxy-4-vinylphenol	244.37 ± 72.50 ^a	278.55 ± 19.55 ^a	116.77 ± 13.91 ^b	156.58 ± 24.35 ^b	156.87 ± 21.90 ^b	170.72 ± 17.92 ^b
	Total	5654.90 ± 517.77^a	4358.07 ± 361.83^b	1186.21 ± 44.28^d	1271.78 ± 138.29^d	2395.67 ± 133.90^c	4796.07 ± 302.77^b
Heterocyclics							
47	3-furaldehyde	13.69 ± 1.14 ^b	12.62 ± 1.79 ^b	13.72 ± 0.14 ^b	13.07 ± 1.05 ^b	11.62 ± 0.38 ^b	16.03 ± 1.40 ^a
48	1-(2-furanyl)-1-propanone	7.90 ± 0.83 ^a	5.07 ± 0.43 ^b	2.16 ± 0.79 ^c	0.00 ± 0.00	2.04 ± 0.54 ^c	5.20 ± 1.12 ^b
49	butyrolactone	20.43 ± 2.62 ^a	17.68 ± 1.99 ^{ab}	16.54 ± 1.58 ^{ab}	13.91 ± 2.51 ^b	16.58 ± 2.19 ^{ab}	17.27 ± 1.01 ^{ab}
50	2-furanmethanol	323.18 ± 15.34 ^a	242.28 ± 17.51 ^b	207.68 ± 19.15 ^{bcd}	182.03 ± 23.79 ^d	201.37 ± 9.03 ^{cd}	230.25 ± 29.29 ^{bc}
51	2-oxo-1-methyl-3-isopropylpyrazine	9.99 ± 0.76 ^a	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	7.74 ± 1.00 ^b
52	maltol	185.90 ± 14.37 ^b	242.92 ± 25.54 ^a	139.15 ± 39.49 ^{bc}	172.08 ± 33.20 ^b	173.52 ± 33.11 ^b	101.49 ± 28.13 ^c
53	3-phenyl-furan	11.51 ± 0.77 ^b	23.38 ± 1.46 ^a	9.74 ± 0.94 ^{bc}	10.93 ± 1.25 ^{bc}	10.46 ± 0.37 ^{bc}	9.57 ± 0.43 ^c
54	1, 2-benzisothiazole	13.92 ± 0.90 ^a	3.84 ± 0.46 ^b	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
55	1-(1H-pyrrol-2-yl)-ethanone	279.27 ± 68.93 ^a	291.46 ± 39.60 ^a	164.43 ± 13.76 ^b	166.87 ± 24.25 ^b	211.08 ± 4.36 ^{ab}	242.28 ± 61.37 ^{ab}
56	dehydromevalonic lactone	4.36 ± 1.22 ^{ab}	4.86 ± 0.37 ^a	1.84 ± 0.80 ^c	2.90 ± 0.70 ^{bc}	3.32 ± 1.10 ^{abc}	2.01 ± 0.47 ^c
57	dihydro-5-pentyl-2(3h)-furanone	1.33 ± 0.22 ^a	1.15 ± 0.53 ^a	0.00 ± 0.00	0.33 ± 0.19 ^b	0.44 ± 0.04 ^b	0.59 ± 0.05 ^b
58	4-methoxy-2, 5-dimethyl-3(2h)-furanone	266.13 ± 29.96 ^b	365.83 ± 67.75 ^a	173.61 ± 29.45 ^{bc}	230.10 ± 38.33 ^{bc}	236.95 ± 74.75 ^{bc}	161.25 ± 35.30 ^c
59	5-methyl-2-furanmethanol	3.87 ± 0.42 ^{ab}	5.03 ± 0.97 ^a	2.74 ± 0.67 ^{bc}	1.68 ± 0.34 ^c	3.12 ± 0.61 ^{bc}	4.33 ± 1.85 ^{ab}
60	2-phenyl-pyridine	7.36 ± 0.31 ^a	7.25 ± 1.29 ^a	0.00 ± 0.00	4.78 ± 1.67 ^b	4.45 ± 1.66 ^b	6.04 ± 0.12 ^{ab}
61	4h-pyran-4-one, 3-hydroxy-2, 6-dimethyl	29.42 ± 2.56 ^b	39.82 ± 6.58 ^a	10.73 ± 2.70 ^c	15.73 ± 2.64 ^c	14.55 ± 5.15 ^c	11.76 ± 3.82 ^c
62	2, 3-dihydro-benzofuran	12.27 ± 0.53 ^{ab}	12.52 ± 3.45 ^{ab}	7.93 ± 0.55 ^b	11.66 ± 3.67 ^{ab}	11.41 ± 2.01 ^{ab}	13.87 ± 2.47 ^a
63	N, N'-di-benzoyloxy-heptanediamide	31.96 ± 1.91 ^{abc}	45.39 ± 9.04 ^a	25.80 ± 10.12 ^{bc}	38.34 ± 10.15 ^{ab}	23.36 ± 0.03 ^c	19.04 ± 5.71 ^c
□	total	1222.49 ± 142.81^a	1321.09 ± 178.76^a	776.08 ± 120.12^b	864.41 ± 143.74^b	924.27 ± 135.33^b	848.72 ± 173.55^b

* Mean values in the same row with different superscripted letters indicate that they are significantly different at p<0.05. ANOVA analysis was applied