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Erratum: Screening of volatile organic compounds emitted from different packaging materials: case study on fresh-cut artichokes

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KEYWORDS

packaging, artichoke, volatile organic compounds, sustainability, gas-chromatography-mass spectrometry, branched alkanes, alkenes

An Erratum on

[Screening of volatile organic compounds emitted from different packaging materials: case study on fresh-cut artichokes](#)

by Ashraf, J. Z., Pati, S., Fatchurrahman, D., Amodio, M. L., and Colelli, G. (2023). *Front. Sustain. Food Syst.* 7:1178104. doi: 10.3389/fsufs.2023.1178104

Due to a production error, there was a mistake in [Table 2](#) as published. The names of compounds were changed in the “Compounds” column due to the removal of commas in some cases. The corrected [Table 2](#) appears below. The publisher apologizes for this mistake.

TABLE 2 Number, retention times, and name of identified compounds in MP-PA/PP, MP-PP and MP-PLA, peak area, presence in package headspace and in packed artichoke, and the references relevant to each compound.

No	Rt (min)	Compounds	PA'(peak area $\times 10^{-6}$)	PP (peak area $\times 10^{-6}$)	PLA (peak area $\times 10^{-6}$)	Package-headspace	Package-artichoke	References
1	4.25	2-Methyl-1-pentene	0.28 ± 0.07					Bortoluzzi et al., 2008
2	5.03	4-Methyl-heptane	17.11 ± 0.63			MP-PP/PA	MP-PP/PA	Nerin et al., 2002; Ibarra et al., 2019
3	5.44	Octane		0.25 ± 0.01		MP-PP		Still et al., 2013
4	5.58	2,4-Dimethyl-heptane	10.47 ± 0.01			MP-PP/PA	MP-PP/PA	Ibarra et al., 2019
5	6.34	2,3-Dimethyl-heptane	1.78 ± 0.07					Ibarra et al., 2019
6	6.43	4-Methyl-octane	12.83 ± 0.29			MP-PP/PA	MP-PP/PA	Han et al., 2020
7	6.98	2,4-Dimethyl-1-heptene	59.49 ± 1.09			MP-PP/PA	MP-PP/PA	Han et al., 2020
8	8.93	3,5-Dimethyl-octane	4.72 ± 1.25			MP-PP/PA		Osorio et al., 2020
9	10.31	2,6-Dimethyl-nonane	9.77 ± 0.20			MP-PP/PA		Driffield et al., 2014; Ibarra et al., 2019
10	10.46	4-6 Dimethyl-undecane	14.63 ± 0.73			MP-PP/PA	MP-PP/PA	Osorio et al., 2020
11	10.68	2,5-Dimethyl-nonane	2.76 ± 0.60			MP-PP/PA		Clemente et al., 2016; Han et al., 2020
12	10.84	3,3-Dimethyl-octane	4.04 ± 0.79			MP-PP/PA		Driffield et al., 2014
13	11.83	4-Ethyl-decane	12.54 ± 0.45			MP-PP/PA		Mitchell et al., 2014
14	12.02	3,7-Dimethyl-decane	4.95 ± 0.12			MP-PP/PA		Han et al., 2020
15	12.47	5-Methyl-decane	0.95 ± 0.25			MP-PP/PA		Clemente et al., 2016
16	12.65	4-Methyl-decane	1.50 ± 0.36			MP-PP/PA		Clemente et al., 2016
17	13.94	3,7-Dimethyl-decane	10.06 ± 0.34			MP-PP/PA		Han et al., 2020
18	14.21	3,6-Dimethyl-decane	5.15 ± 0.46			MP-PP/PA		Han et al., 2020
19	14.66	4-Methyl-undecane	2.30 ± 0.39			MP-PP/PA		Song et al., 2019
20	14.90	Alkene (Unknown)	13.87 ± 0.62			MP-PP/PA		
21	15.09	Alkene (Unknown)	12.76 ± 0.57			MP-PP/PA		
22	16.08	1-Methoxy-2-propanol		0.34 ± 0.21	2.29 ± 2.61			Castle et al., 1997
23	18.89	Heptanal		0.76 ± 0.24				Panseri et al., 2014
24	19.69	4,8-Dimethyl-undecane	1.29 ± 0.03					Osorio et al., 2020
25	19.84	4-Methyl-2-heptanone	0.27 ± 0.01					Lestido-Cardama et al., 2020

(Continued)

TABLE 2 (Continued)

No	R _t (min)	Compounds	PA'(peak area $\times 10^{-6}$)	PP (peak area $\times 10^{-6}$)	PLA (peak area $\times 10^{-6}$)	Package-headspace	Package-dartichoke	References
26	20.08	4,6-Dimethyl-dodecane	1.90 ± 0.08					Sapozhnikova et al., 2021
27	20.37	4,6-Dimethyl-dodecane isomer	1.59 ± 0.33					Sapozhnikova et al., 2021
28	21.29	Nonadecane	3.75 ± 0.04					Chytiri et al., 2008
29	23.74	Octanal		0.41 ± 0.04				Vera et al., 2020
30	23.75	2,6,11-Trimethyl-dodecane	2.89 ± 0.29			MP-PP/PA		Han et al., 2020
31	25.17	Alkene (Unknown)	5.72 ± 0.55					
32	28.50	Nonanal (Nonyl Aldehyde)	3.64 ± 0.28	4.61 ± 0.09	2.27 ± 0.15	MP-PP/PA		Panseri et al., 2014
33	31.23	Acetic acid	0.75 ± 0.13	2.20 ± 0.06	4.20 ± 0.12	MP-PP/PA, MP-PP, MP-PLA	MP-PP/PA, MP-PP, MP-PLA	Mcneal et al., 2004; Tyapkova et al., 2009
34	32.50	2-Ethyl-1-hexanol		0.47 ± 0.51	0.99 ± 1.12	MP-PP, MP-PLA	MP-PP, MP-PLA	Tsochatzis et al., 2021
35	33.05	decanal			0.86 ± 0.05			Vera et al., 2020
36	34.8	Propanoic acid			0.35 ± 0.02			Kawamura, 2004; Zhang et al., 2017
37	35.30	Octanol			0.14 ± 0.02			Vera et al., 2020
38	46.23	Butylated hydroxytoluene	0.93 ± 0.16					Li et al., 2014; Lestido-Cardama et al., 2020

Peak area values are shown as mean of three replicates ± standard deviation.

References

- Bortoluzzi, J. H., Cristiano, R., Gallardo, H. A., Carasek, E., and Soldi, V. (2008). Use of the SPME-GC-MS technique to study the thermal degradation of isotactic polypropylene: effects of temperature and reaction time, and analysis of the reaction mechanism. *E-Polymers* 8, 193. doi: 10.1515/epoly.2008.8.1.193
- Castle, L., Offen, C. P., Baxter, M. J., and Gilbert, J. (1997). Migration studies from paper and board food packaging materials. 1. *Food Addit Contam* 14, 35–44. doi: 10.1080/02652039709374495
- Chytiri, S., Goulas, A. E., Badeka, A., Riganakos, K. A., Petridis, D., and Kontominas, M. G. (2008). Determination of radiolysis products in gamma-irradiated multilayer barrier food packaging films containing a middle layer of recycled LDPE. *Radiat. Phys. Chem.* 77, 1039–1045. doi: 10.1016/j.radphyschem.2008.04.007
- Clemente, I., Aznar, M., Nerín, C., and Bosetti, O. (2016). Migration from printing inks in multilayer food packaging materials by GC-MS analysis and pattern recognition with chemometrics. *Food Addit. Contam. Part A Chem. Anal. Control Expo Risk Assess* 33, 703–714. doi: 10.1080/19440049.2016.1155757
- Driffeld, M., Bradley, E., Leon, I., Lister, L., Speck, D., Castle, L., et al. (2014). Analytical screening studies on irradiated food packaging. *Food Addit. Contam. Part A Chem. Anal. Control Expo Risk Assess* 31, 556–565. doi: 10.1080/19440049.2013.865087
- Han, X., Wu, Y., Chen, G., Wang, X., Yuan, W., and Lv, Z. (2020). Optimization of a headspace solid-phase microextraction-gas chromatography-mass spectrometry procedure for odor compounds from polyolefin resin used in plastic food packaging. *Packag. Technol. Sci.* 33, 515–529. doi: 10.1002/pts.2532
- Ibarra, V. G., De Quirós, A. R. B., Losada, P. P., and Sendón, R. (2019). Non-target analysis of intentionally and non-intentionally added substances from plastic packaging materials and their migration into food simulants. *Food Packag. Shelf Life* 21, 100325. doi: 10.1016/j.fpsl.2019.100325
- Kawamura, Y. (2004). *Effects of gamma irradiation on polyethylene, polypropylene, and polystyrene*. ACS Publications, Washington, D.C.
- Lestido-Cardama, A., Sendón, R., Bustos, J., Lomo, M. L., Losada, P. P., and De Quirós, A. R. B. (2020). Dietary exposure estimation to chemicals transferred from milk and dairy products packaging materials in Spanish child and adolescent population. *Foods* 9, 1554. doi: 10.3390/foods9111554
- Li, C., Li, Y., Chen, Z., Liang, F., Chen, X., Wu, S., et al. (2014). Simultaneous determination of antioxidants and ultraviolet absorbers by ultra-performance liquid chromatography in food simulants. *Food Anal. Methods* 7, 1755–1762. doi: 10.1007/s12161-014-9811-0
- Mcneal, T., Komolprasert, V., Buchalla, R., and Begley, T. (2004). “Effects of ionizing radiation on food contact materials” in *Chapter 14 on Irradiation of Food and Packaging ACS Symposium Series* (Washington, DC: ACS Publications. Konolprasert and Morehouse), U84.
- Mitchell, G., Higgitt, C., and Gibson, L. T. (2014). Emissions from polymeric materials: characterised by thermal desorption-gas chromatography. *Polym. Degrad. Stab.* 107, 328–340. doi: 10.1016/j.polymdegradstab.2013.12.003
- Nerin, C., Acosta, D., and Rubio, C. (2002). Potential migration release of volatile compounds from plastic containers destined for food use in microwave ovens. *Food Addit. Contam.* 19, 594–601. doi: 10.1080/02652030210123887
- Osorio, J., Aznar, M., Nerín, C., Birse, N., Elliott, C., and Chevallier, O. (2020). Ambient mass spectrometry as a tool for a rapid and simultaneous determination of migrants coming from a bamboo-based biopolymer packaging. *J. Hazard. Mater.* 398, 122891. doi: 10.1016/j.jhazmat.2020.122891
- Panseri, S., Chiesa, L. M., Zecconi, A., Soncini, G., and De Noni, I. (2014). Determination of volatile organic compounds (VOCs) from wrapping films and wrapped PDO Italian cheeses by using HS-SPME and GC/MS. *Molecules* 19, 8707–8724. doi: 10.3390/molecules19078707
- Sapozhnikova, Y., Nuñez, A., and Retired, J. J. (2021). Screening of chemicals migrating from plastic food contact materials for oven and microwave applications by liquid and gas chromatography-Orbitrap mass spectrometry. *J. Chromatogr. A* 1651, 462261. doi: 10.1016/j.chroma.2021.462261
- Song, X.-C., Wrona, M., Nerín, C., Lin, Q.-B., and Zhong, H.-N. (2019). Volatile non-intentionally added substances (NIAS) identified in recycled expanded polystyrene containers and their migration into food simulants. *Food Packag. Shelf Life* 20:100318. doi: 10.1016/j.fpsl.2019.100318
- Still, M., Schlummer, M., Gruber, L., Fiedler, D., and Wolz, G. (2013). Impact of industrial production and packaging processes on the concentration of per- and polyfluorinated compounds in milk and dairy products. *J. Agric. Food Chem.* 61, 9052–9062. doi: 10.1021/jf4020137
- Tsochatzis, E. D., Lopes, J. A., Gika, H., Dalgaard, T. K., and Theodoridis, G. (2021). A fast SALLE GC-MS/MS multi-analyte method for the determination of 75 food packaging substances in food simulants. *Food Chem.* 361, 129998. doi: 10.1016/j.foodchem.2021.129998
- Tyapkova, O., Czerny, M., and Buettner, A. (2009). Characterisation of flavour compounds formed by γ -irradiation of polypropylene. *Polym. Degrad. Stab.* 94, 757–769. doi: 10.1016/j.polymdegradstab.2009.02.006
- Vera, P., Canellas, E., and Nerín, C. (2020). Compounds responsible for off-odors in several samples composed by polypropylene, polyethylene, paper and cardboard used as food packaging materials. *Food Chem.* 309, 125792. doi: 10.1016/j.foodchem.2019.125792
- Zhang, S., Sheng, C., Zhang, J., Li, Y., and You, J. (2017). Gas purge microsyringe extraction coupled with dispersive liquid-liquid microextraction for the determination of acidic compounds in food packaging materials. *Food Anal. Methods* 10, 1164–1171. doi: 10.1007/s12161-016-0660-x