

## Common contaminants

Common contaminants of plastic food packaging materials

🕒 October 9, 2012 📍 Charlotte Wagner

Food Packaging Material*	Food Contact Material	Typical Migrants	Typical uses
Plastic Foil	PET (polyethylene terephthalate)	<ul style="list-style-type: none"> <li>Formaldehyde [1]</li> <li>Acetaldehyde [1]</li> <li>Antimony [2]</li> <li>UV Stabilizers [3]</li> <li>Polybrominated Dimethylesters (PBDE) [4]</li> </ul>	<ul style="list-style-type: none"> <li>Adverse outcome pathways (https://www.foodpackagingforum.org/food-packaging-health/adverse-outcome-pathways)</li> <li>Joghurt cup lids</li> </ul>
	PE	<ul style="list-style-type: none"> <li>Polyolefin oligomeric saturated hydrocarbons (POSH) [5]</li> <li>Nonylphenol [6]</li> </ul>	<ul style="list-style-type: none"> <li>Biocides (https://www.foodpackagingforum.org/food-packaging-health/biocides-and-food-contact-materials)</li> <li>Biomonitoring (https://www.foodpackagingforum.org/food-packaging-health/biomonitoring)</li> <li>Freezer bags, frozen poultry and ham bags, prepackaged fresh produce, food storage containers [7, 8]</li> </ul>
Plastic bottle	PVC	<ul style="list-style-type: none"> <li>Vinyl chloride [9]</li> <li>Organo tins [10]</li> <li>Adipates [11]</li> <li>Plasticiser [11, 12]</li> <li>nonylphenol [13]</li> </ul>	<ul style="list-style-type: none"> <li>Bisphenol A (https://www.foodpackagingforum.org/food-packaging-health/bisphenol-a)</li> <li>Shrink foil, shrink foil</li> <li>prepackaged meat, cheese, fruit and vegetables [8]</li> </ul>
	HDPE	<ul style="list-style-type: none"> <li>Antimony [4]</li> <li>Polybrominated Dimethylesters (PBDE) [11]</li> </ul>	<ul style="list-style-type: none"> <li>Bisphenol S (https://www.foodpackagingforum.org/food-packaging-health/bisphenol-s)</li> <li>Milk, dairy products [8]</li> </ul>
Plastic bottle	Cellulose	<ul style="list-style-type: none"> <li>Triacetin [14]</li> </ul>	<ul style="list-style-type: none"> <li>Can coatings (https://www.foodpackagingforum.org/food-packaging-health/can-coatings)</li> <li>Meat packaging [8]</li> </ul>
	PET (polyethylene terephthalate)	<ul style="list-style-type: none"> <li>Formaldehyde [1]</li> <li>Acetaldehyde [1]</li> <li>Antimony [4, 15]</li> <li>UV Stabilizers [3]</li> <li>Adipates [16 (file:///C:/Users/Charlotte%20Wagner/Documents/Work/Webpage/Food%20Packaging%20Table%20Plastic%20Doc%20ENRF_16)]</li> <li>Phthalates [16]</li> <li>Polybrominated Dimethylesters (PBDE) [4]</li> </ul>	<ul style="list-style-type: none"> <li>Chemical Risk Assessment (https://www.foodpackagingforum.org/food-packaging-health/chemical-risk-assessment)</li> <li>Soft drinks, CSD** (single use) [8]</li> <li>Chronic disease (https://www.foodpackagingforum.org/food-packaging-health/chronic-disease)</li> <li>Environmental exposures (https://www.foodpackagingforum.org/food-packaging-health/developmental-exposures)</li> <li>Repeated use water bottles, baby feeding bottles [14]</li> <li>Endocrine disruptors (https://www.foodpackagingforum.org/food-packaging-health/endocrine-disruptors)</li> <li>Water and soft drink bottles (single use)[14]</li> </ul>
Plastic trays and inserts	PC (polycarbonate)	<ul style="list-style-type: none"> <li>Bisphenol A [14, 17]</li> <li>Antimony [4]</li> <li>Polybrominated dimethylethers (PBDE) [2, 4]</li> <li>4-nonylphenol [17]</li> </ul>	<ul style="list-style-type: none"> <li>Epigenetics (https://www.foodpackagingforum.org/food-packaging-health/epigenetics)</li> <li>Chocolate box inserts, food trays, biscuit tins [14]</li> </ul>
	PVC (polyvinylchloride)	<ul style="list-style-type: none"> <li>Vinyl chloride [9]</li> <li>Plasticiser [12]</li> <li>Organo tins [10]</li> <li>Nonylphenol [4, 18, 19]</li> </ul>	<ul style="list-style-type: none"> <li>EU Parliament Report on FCMS (https://www.foodpackagingforum.org/food-packaging-health/eu-parliament-report-on-fcms)</li> <li>Yoghurt, dairy products, honey, syrup and ice cream, marmalade and jam tubs and containers; trays for prepackaged meat and fruit [14]</li> </ul>
Plastic trays (oven proof)	PVC (polyvinylchloride)	<ul style="list-style-type: none"> <li>Vinyl chloride [9]</li> <li>Plasticiser [12]</li> <li>Organo tins [10]</li> <li>Plasticiser [11, 12]</li> <li>Nonylphenol [18, 19],</li> </ul>	<ul style="list-style-type: none"> <li>EU Parliament Report on FCMS (https://www.foodpackagingforum.org/food-packaging-health/eu-parliament-report-on-fcms)</li> <li>Yoghurt, dairy products, honey, syrup and ice cream, marmalade and jam tubs and containers; trays for prepackaged meat and fruit [14]</li> </ul>
	PS (polystyrene)	<ul style="list-style-type: none"> <li>Styrene [20] (found for cups)</li> <li>Styrene trimers [21]</li> <li>Polybrominated dimethylesters (PBDE) [4]</li> </ul>	<ul style="list-style-type: none"> <li>FACET exposure tool (https://www.foodpackagingforum.org/food-packaging-health/facet-exposure-tool)</li> <li>Yoghurt, dairy products, honey, syrup and ice cream, marmalade and jam tubs and containers; trays for prepackaged meat and fruit [14]</li> </ul>
Plastic trays (oven proof)	PET (polyethylene terephthalate)	<ul style="list-style-type: none"> <li>Formaldehyde [1, 15]</li> <li>Acetaldehyde [1, 15]</li> <li>Antimony [4]</li> <li>UV Stabilizers [3]</li> </ul>	<ul style="list-style-type: none"> <li>Food Packaging Materials (https://www.foodpackagingforum.org/food-packaging-health/food-packaging-materials)</li> <li>oven proof or microwavable food</li> <li>Glass (https://www.foodpackagingforum.org/food-packaging-health/glass)</li> </ul>

Plastic cups	PP (polypropylene)	<ul style="list-style-type: none"> <li>Polyolefin oligomeric saturated hydrocarbons (POSH) [5]</li> <li>Erucamide, oleamide [7]</li> <li>Antioxidants [7]</li> <li>Phthalates [7]</li> </ul>	<ul style="list-style-type: none"> <li>Carbons (POSH) [5] materials/glass</li> <li>&gt; Metal (https://www.foodpackagingforum.org/food-packaging-health/food-packaging-materials/metal) [14]</li> </ul>	Vending cups
	PS (Polystyrene)	<ul style="list-style-type: none"> <li>Styrene [20]</li> <li>Styrene trimers [21]</li> <li>Polybrominated dimethylesters PBDE [4]</li> </ul>	<ul style="list-style-type: none"> <li>Paper and board (https://www.foodpackagingforum.org/food-packaging-health/food-packaging-materials/paper-and-board) [14]</li> </ul>	
Plastic pouches	Aluminium	<ul style="list-style-type: none"> <li>Aluminium [8]</li> </ul>		
	PP (polypropylene)	<ul style="list-style-type: none"> <li>Polyolefin oligomeric saturated hydrocarbons (POSH) [5]</li> <li>Erucamide, oleamide [7]</li> <li>Antioxidants [7]</li> </ul>	<ul style="list-style-type: none"> <li>Carbons (POSH) [5] materials/paper-and-board</li> <li>&gt; Plastics (https://www.foodpackagingforum.org/food-packaging-health/food-packaging-materials/plastics) [14]</li> </ul>	Crisps, biscuits, snack foods, sugar, grains and vegetables [14]
	PET	<ul style="list-style-type: none"> <li>Formaldehyde [1, 15]</li> <li>Acetaldehyde [1, 15]</li> <li>Antimony [15]</li> <li>UV Stabilizers [3]</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Common contaminants (https://www.foodpackagingforum.org/food-packaging-health/food-packaging-materials/plastics/common-contaminants) [14]</li> </ul>	Boil in the bag food [8]
*Layer in direct contact with food				
** carbonated soft drinks				
<b>References</b>				
1. Mutsuga, M., et al., <i>Survey of formaldehyde, acetaldehyde and oligomers in polyethylene terephthalate food-packaging materials</i> ( <a href="http://www.ncbi.nlm.nih.gov/pubmed?term=Mutsuga%2C%20M.%2C%20et%20al.%2C%20Survey%20of%20formaldehyde%20and%20acetaldehyde%20and%20oligomers%20in%20polyethylene%20terephthalate%20food-packaging%20materials.%20Food%20Addit%20Contam.%202005.%2022(8):783-789">http://www.ncbi.nlm.nih.gov/pubmed?term=Mutsuga%2C%20M.%2C%20et%20al.%2C%20Survey%20of%20formaldehyde%20and%20acetaldehyde%20and%20oligomers%20in%20polyethylene%20terephthalate%20food-packaging%20materials.%20Food%20Addit%20Contam.%202005.%2022(8):783-789</a> ). <i>Food Addit Contam</i> , 2005. 22(8):783-789.				
2. Andra, S.S. and K.C. Makris, <i>Thyroid Disrupting Chemicals in Plastic Additives and Thyroid Health</i> ( <a href="http://www.tandfonline.com/doi/abs/10.1080/10590501.2012.681487">http://www.tandfonline.com/doi/abs/10.1080/10590501.2012.681487</a> ). <i>Journal of Environmental Science and Health, Part C</i> , 2012. 30(2):107-151.				
3. Begley, T.H., et al., <i>Migration of a UV stabilizer from polyethylene terephthalate (PET) into food simulants</i> ( <a href="http://www.ncbi.nlm.nih.gov/pubmed?term=Begley%2C%20T.H.%2C%20et%20al.%2C%20Migration%20of%20a%20UV%20stabilizer%20from%20polyethylene%20terephthalate%20(PET)%20into%20food%20simulants.%20Food%20Addit%20Contam.%202004.%2021(10):1007-1014">http://www.ncbi.nlm.nih.gov/pubmed?term=Begley%2C%20T.H.%2C%20et%20al.%2C%20Migration%20of%20a%20UV%20stabilizer%20from%20polyethylene%20terephthalate%20(PET)%20into%20food%20simulants.%20Food%20Addit%20Contam.%202004.%2021(10):1007-1014</a> ). <i>Food Addit Contam</i> , 2004. 21(10):1007-1014.				
4. Andra, S.S., et al., <i>Co-leaching of brominated compounds and antimony from bottled water</i> ( <a href="http://www.sciencedirect.com/science/article/pii/S0160412011002224">http://www.sciencedirect.com/science/article/pii/S0160412011002224</a> ). <i>Environment International</i> , 2012. 38(1):45-53.				
5. Biedermann-Brem, S., et al., <i>Migration of polyolefin oligomeric saturated hydrocarbons (POSH) into food</i> ( <a href="http://dx.doi.org/10.1080/19440049.2011.641164">http://dx.doi.org/10.1080/19440049.2011.641164</a> ). <i>Food Additives &amp; Contaminants: Part A</i> , 2012. 29(3):449-460.				
6. Alfirevic, M., et al., <i>Presence of nonylphenols in plastic films and their migration into food simulant</i> ( <a href="http://acta-arhiv.chem-soc.si/58/58-1-127.pdf">http://acta-arhiv.chem-soc.si/58/58-1-127.pdf</a> ). <i>Acta Chimica Slovenica</i> , 2011. 58(1):127-133.				
7. Kawamura, Y., et al., <i>Determination of additives in food contact polypropylene</i> ( <a href="https://www.jstage.jst.go.jp/article/shokueishi/41/2/41_2_154/article">https://www.jstage.jst.go.jp/article/shokueishi/41/2/41_2_154/article</a> ). <i>Journal of the Food Hygienic Society of Japan</i> , 2000. 41(2):154-161.				
8. Crompton, T.R., <i>Additive migration from plastics into foods. A guide for analytical chemists</i> ( <a href="http://books.google.ch/books?id=xnPjKd6PwC&amp;pg=PP5&amp;pg=PP5&amp;dq=Crompton,+T.R.,+Additive+Migration+from+Plastics+into+Foods.+A+Guide+for+Analytical+Chemists.+2007,+Shawbury,+Shrewsbury,+Shropshire,+UK+Smithers+Rapra+Technology+Limited">http://books.google.ch/books?id=xnPjKd6PwC&amp;pg=PP5&amp;pg=PP5&amp;dq=Crompton,+T.R.,+Additive+Migration+from+Plastics+into+Foods.+A+Guide+for+Analytical+Chemists.+2007,+Shawbury,+Shrewsbury,+Shropshire,+UK+Smithers+Rapra+Technology+Limited</a> ). 2007, Shawbury, Shrewsbury, Shropshire, UK: Smithers Rapra Technology Limited				
9. Benfenati, E., et al., <i>Migration of vinyl chloride into PVC-bottled drinking-water assessed by gas chromatography-mass spectrometry</i> ( <a href="http://www.ncbi.nlm.nih.gov">http://www.ncbi.nlm.nih.gov</a>				
> Printing inks (https://www.foodpackagingforum.org/food-packaging-health/food-packaging-materials/printing-inks) [14]				
> Wax (https://www.foodpackagingforum.org/food-packaging-health/food-packaging-materials/wax) [14]				
> Wood (https://www.foodpackagingforum.org/food-packaging-health/food-packaging-materials/wood) [14]				
> Melamine (https://www.foodpackagingforum.org/food-packaging-health/food-packaging-materials/melamine) [14]				
> Microplastics (https://www.foodpackagingforum.org/food-packaging-health/microplastics) [14]				
> Migration (https://www.foodpackagingforum.org/food-packaging-health/migration) [14]				
> Migration modeling (https://www.foodpackagingforum.org/food-packaging-health/migration-modeling) [14]				
> Mineral oil hydrocarbons (https://www.foodpackagingforum.org/food-packaging-health/mineral-oil-hydrocarbons) [14]				
> Mixture Toxicity (https://www.foodpackagingforum.org/food-packaging-health/mixture-toxicity) [14]				
> Nanomaterials (https://www.foodpackagingforum.org/food-packaging-health/nanomaterials) [14]				
> Non-intentionally added substances (NIAS) (https://www.foodpackagingforum.org/food-packaging-health/non-intentionally-added-substances-nias) [14]				
> Per- and polyfluoroalkyl substances (PFASs) (https://www.foodpackagingforum.org/food-packaging-health/per-and-polyfluoroalkyl-substances-pfass) [14]				

[/pubmed?term=Benfenati%2C%20E.%2C%20et%20a...%2C%20Migration%20of%20vinyl%20chloride%20into%20PVC-bottled%20drinking-water%20assessed%20by%20gas%20chromatography-mass%20spectrometry.%20Food%20Chem%20Toxicol%2C%201991.%2029\(2\)%3A%20p.%20131-4](#) ). Food Chem Toxicol, 1991. 29(2):131-134.

10. Papaspyrou, S.D., et al., *Determination of migration of n-butyltins and n-octyltins to food simulants by gas chromatography-mass spectrometry*. Appl Organometal Chem, 2007. 21:412-424.

11. Goulas, A.E., A. Kokkinos, and M.G. Kontominas, *Effect of gamma-radiation on migration behaviour of dioctyladipate and acetyltributylcitrate plasticizers from food-grade PVC and PVDC/PVC films into olive oil*. Z Lebensm Unters Forsch, 1995. 201(1):74-78.

12. Petersen, J.H. and L.K. Jensen, *Phthalates and food-contact materials: enforcing the 2008 European Union plastics legislation* (<http://dx.doi.org/10.1080/19440049.2010.501829>). Food Additives & Contaminants: Part A, 2010. 27(11):1608-1616.

13. Votavova, L., et al., *Migration of Nonylphenols from Polymer Packaging Materials into Food Simulants* (<http://www.agriculturejournals.cz/uniqueFiles/10123.pdf>). Czech Journal of Food Sciences, 2009. 27(4):293-299.

14. Sendón García, R., et al., *Revision of analytical strategies to evaluate different migrants from food packaging materials*. (<http://www.sciencedirect.com/science/article/pii/S0924224406000070>) Trends in Food Science & Technology, 2006. 17(7):354-366.

15. Bach, C., et al., *Chemical compounds and toxicological assessments of drinking water stored in polyethylene terephthalate (PET) bottles: A source of controversy reviewed* (<http://www.sciencedirect.com/science/article/pii/S0043135411007548>). Water Res, 2012. 46(3):571-583.

16. Schmid, P., et al., *Does the reuse of PET bottles during solar water disinfection pose a health risk due to the migration of plasticisers and other chemicals into the water?* (<http://www.sciencedirect.com/science/article/pii/S0043135408004168>) Water Res, 2008. 42(20):5054-5060.

17. Guart, A., et al., *Migration of plasticizers phthalates, bisphenol A and alkylphenols from plastic containers and evaluation of risk* (<http://www.informaworld.com/10.1080/19440049.2011.555845>). Food Additives & Contaminants: Part A: Chemistry, Analysis, Control, Exposure & Risk Assessment, 2011. 28(5):676-685.

18. Bradley, E., *Nonylphenol in food contact plastics and migration into foods* ([http://books.google.ch/books?id=dbhw41MFBA8C&pg=PA104&lpg=PA104&dq=Bradley,+E.,+Nonylphenol+in+food+contact+plastics+and+migration+into+foods,+&source=bl&ots=M2hiKkTiR&sig=JJETx0N39m5ru8guTwBGI\\_EHfK0&hl=en&sa=X&ei=yj11ULTbO4basgb\\_OIHQCw&ved=0CDAQ6AEwAA#v=onepage&q=Bradley%2C%20E.%2C%20Nonylphenol%20in%20food%20contact%20plastics%20and%20migration%20into%20foods%2C&f=false](http://books.google.ch/books?id=dbhw41MFBA8C&pg=PA104&lpg=PA104&dq=Bradley,+E.,+Nonylphenol+in+food+contact+plastics+and+migration+into+foods,+&source=bl&ots=M2hiKkTiR&sig=JJETx0N39m5ru8guTwBGI_EHfK0&hl=en&sa=X&ei=yj11ULTbO4basgb_OIHQCw&ved=0CDAQ6AEwAA#v=onepage&q=Bradley%2C%20E.%2C%20Nonylphenol%20in%20food%20contact%20plastics%20and%20migration%20into%20foods%2C&f=false)), F.S. Agency, Editor 2010

19. Inoue, K., et al., *Migration of 4-nonylphenol from polyvinyl chloride food packaging films into food simulants and foods*. ([http://www.ncbi.nlm.nih.gov/pubmed?term=Inoue%2C%20K.%2C%20et%20a.%2C%20Migration%20of%204-nonylphenol%20from%20polyvinyl%20chloride%20food%20packaging%20films%20into%20food%20simulants%20and%20foods.%20Food%20Contam.%202001.%2018\(2\)%3A%20p.%20157-64](http://www.ncbi.nlm.nih.gov/pubmed?term=Inoue%2C%20K.%2C%20et%20a.%2C%20Migration%20of%204-nonylphenol%20from%20polyvinyl%20chloride%20food%20packaging%20films%20into%20food%20simulants%20and%20foods.%20Food%20Contam.%202001.%2018(2)%3A%20p.%20157-64)) Food Addit Contam, 2001. 18(2):157-164.

20. Ahmad, M. and A.S. Bajahlan, *Leaching of styrene and other aromatic compounds in drinking water from PS bottles* ([http://www.ncbi.nlm.nih.gov/pubmed?term=IAhmad%2C%20M.%20and%20A.S.%20Bajahlan%2C%20Leaching%20of%20styrene%20and%20other%20aromatic%20compounds%20in%20drinking%20water%20from%20PS%20bottles.%20J%20Env.%202007.%2019\(4\)%3A%20p.%20421-](http://www.ncbi.nlm.nih.gov/pubmed?term=IAhmad%2C%20M.%20and%20A.S.%20Bajahlan%2C%20Leaching%20of%20styrene%20and%20other%20aromatic%20compounds%20in%20drinking%20water%20from%20PS%20bottles.%20J%20Env.%202007.%2019(4)%3A%20p.%20421-) ). J Environ Sci

> Phthalates  
(<https://www.foodpackagingforum.org/food-packaging-health/phthalates>)

> Plastic recycling  
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> UV filters in food packaging  
(<https://www.foodpackagingforum.org/food-packaging-health/uv-filters-in-food-packaging>)

(China), 2007. 19(4):421-426.

21. Choi, J.O., et al., *Migration of styrene monomer, dimers and trimers from polystyrene to food simulants*

(<http://www.ncbi.nlm.nih.gov/pubmed?term=Choi%2C%20J.O.%2C%20et%20al.>

[%2C%20Migration%20of%20styrene%20monomer](#)

[%2C%20dimers%20and%20trimers%20from%20polystyrene%20to%20food%20simulants.%20Food%20Addit%20Contam](#)

[%2C%202005.%2022\(7\)%3A%20p.%20693-9](#)...). Food Addit

Contam, 2005. 22(7):693-699.

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