

Determination of phthalates in foods and establishing methodology to distinguish their source

Area of research interest: [Chemical hazards in food and feed](#)

Study duration: 2008-02-01

Project code: C01048

Conducted by: Food and Environment Research Agency (FERA)

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Background

Phthalates are a group of compounds that are used as plasticisers and found in a wide range of consumer and household goods. Phthalates may be present in food due to migration from food contact materials, including processing equipment and packaging. However, they are also widespread and persistent in the environment and may therefore enter the food chain from environmental sources.

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Research Approach

Analytical methodology was developed and validated for 17 phthalate diesters, 9 phthalate monoesters, phthalic acid and total phthalates in foods. The methods were used to analyse Total Diet Study samples in order to allow estimation of dietary intakes. A total of 29 retail samples were analysed to try and distinguish between food contact and environmental sources of phthalates. These samples were chosen to include foods likely to contain phthalates originating from both sources. A total of 261 retail food samples were also analysed to establish the ranges of phthalates in food.

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Results

The analytical methods were validated and their applicability was demonstrated by the analysis of high fat, high carbohydrate and high protein foodstuffs as well as combinations of all three major food constituents. The methods were used to analyse UK Total Diet Study samples. Five of the 17 phthalate diesters tested were present in 11 out of the 20 TDS food groups. Two of the 9 phthalate monoesters tested were present in 4 out of the 20 TDS groups, whilst phthalic acid was reported for 11 out of the 20 TDS food groups. To follow up the TDS work, 261 food samples were purchased at retail outlets and tested for 15 of the 17 phthalate diester compounds for which the methodology was validated. Phthalate diesters were found in 77 of the 261 samples. The same phthalate diesters were detected in the retail samples as the TDS samples. The Committee on Toxicology (COT) considered these results in 2011 and concluded that levels of phthalates found in samples from the 2007 TDS did not indicate a risk to human health from dietary exposure alone. However the COT considered that other, non-dietary, sources of exposure would need to be considered in a full risk assessment for phthalates.

For the phthalate source studies, 29 foodstuffs were analysed along with their packaging to establish the presence or absence of phthalates in the packaging materials. Phthalates were detected at low levels in 9 of the 29 packaging materials. Studies carried out in this part of the project confirmed that phthalates could be present in foods as a result of migration from food packaging materials.

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Additional Info

See the [COT statement on dietary exposure to phthalates - data from the Total Diet Study \(TDS\)](#)

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Published Papers

1. Fernandes, A., Rose, M.D., Mortimer, D.N., Carr, M., Panton, S. & Smith, F. (2011) Mixed brominated/chlorinated dibenzo-p-dioxins, dibenzofurans and biphenyls: simultaneous congener-selective determination in food. *Journal of Chromatography A*, 1218, 9279-9287 doi:10.1016/j.chroma.2011.10.058
2. Bradley, E.L., Burden, R.A., Leon, I., Mortimer, D.N., Speck, D.R. & Castle, L. (2013) Determination of phthalate diesters in foods. *Food Additives & Contaminants: Part A* doi: 10.1080/19440049.2013.781683
3. Bradley, E.L., Burden, R.A., Bentayeb, K., Driffield, M., Harmer, N., Mortimer, D.N., Speck, D.R., Ticha, J. & Castle, L. (2013) Exposure to phthalic acid, phthalate diesters and phthalate monoesters from foodstuffs: UK total diet study results. *Food Additives & Contaminants: Part A* doi: 10.1080/19440049.2013.781684

Research report

England, Northern Ireland and Wales

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