



# Estimation of Dietary Exposure to Contaminants Transferred from the Packaging in Fatty Dry Foods Based on Cereals

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## Abstract

Food packaging has received special attention from the food safety stand since it can be a possible supply of contamination through the migration of chemical substances from the packaging material into food. The assessment of the exposure through the diet to those contaminants from food packaging is critical. During this work, accurate estimation of dietary exposure of the young Spanish population (1–17 years) to focus on chemicals from packaging for fatty dried foods supported cereals was assessed. For this purpose, a gas natural process coupled to mass spectroscopy (GC–MS) technique was developed for screening of volatile and semivolatile compounds, potential migrants from the packaging. Then, this method was used to quantify eight target analytes, that were antecedently known within the packaging (including phthalates, acetyl radical tributyl tin (ATBC), butylated hydroxytoluene (BHT) and octocrylene), in composite food samples of fatty cereals ready consistent with the consumption information for various age teams. Among the phthalates, exposure to diethyl phthalate (DEP) was the best for the 3 teams thought-about (0.0761–0.545  $\mu\text{g}/\text{kg}$  body weight/day), followed by bis(2-ethylhexyl)phthalate (DEHP), whereas very cheap mean intake was found for di-n-octyl phthalate (DNOP; zero.00463–0.0209  $\mu\text{g}/\text{kg}$  body weight/day). The calculable dietary exposures didn't exceed for any of the analytes the corresponding established tolerable daily intakes.

**Keywords:** fatty cereal primarily based foods; multilayer polymers; dietary exposure; screening; food contaminants; GC–MS

## Introduction

Food packaging has become an imperative tool in food producing since it protects the food from contamination (chemical, biological and physical) holding its biological process properties and sensory characteristics, that extends the shelf-life of the merchandise. Chemical compound films square measure unremarkably used as food packaging thanks to their versatility; they're simply processed and may acquire completely different shapes and sizes. In some cases, the practicality and properties of this material square measure more increased by combining completely different chemical compound layers to create a multilayer structure wherever every layer develops a particular operate .

Despite the benefits that packaging provides to the patron, there square measure several debates regarding environmental and health topics since food packaging might represent a possible supply of contamination. Food packaging materials don't seem to be solely composed of deliberately intercalary substances (IAS; e.g., monomers, additives as antioxidants, lubricants, plasticizers, etc.), they may conjointly contain the popularly referred to as non-intentionally intercalary substances (NIAS) like decomposition merchandise, reaction intermediates, impurities, etc., that might migrate from the packaging into food, significantly into fatty foods. This reality is undesirable, however a precise transfer is inevitable as a result of presently the bulk of foodstuffs square measure commercially prepacked. The matter arises once the quantities of those migrating compounds that square measure transferred into foodstuffs might endanger health of the patron or cause unacceptable changes within the composition or organoleptic characteristics of the food.

## Materials and ways

Acetonitrile for liquid natural process (ACN), fermentation alcohol absolute for analysis (EtOH), fuel for gas natural process (MeOH) and n-hexane for gas natural process ECD and FID (HEX) were provided from Merck (Darmstadt, Germany). Analytical standards with high purity were utilized in the study. Butylated hydroxytoluene (BHT) ninety nine, di-n-octyl phthalate (DNOP) ninety nine.5%, bis(2-ethylhexyl)phthalate (DEHP) ninety nine, acetyl radical tributyl tin (ATBC) ninety nine and as an enclosed normal diethyl phthalate-3,4,5,6-d4 (DEP-d) ninety nine.3% were purchased from Fluka (Steinheim, Germany). whereas diethyl phthalate (DEP) ninety nine.5%, dibutyl phthalate (DBP) ninety nine, diisobutyl phthalate (DIBP) ninety nine and octocrylene (OCTO) ninety seven were provided by Sigma-Aldrich (Schnelldorf, Germany). The chemical structures and also the chemistry characteristics of the analytes studied square measure given.

## Results and Discussion

In this study, a GC–MS screening analysis was used to determine potential chemical migrants that would be gift within the studied plastic packaging materials. All detected peaks with the simplest matches found throughout the library search were thought-about within the study. The followed approach allowed one to tentatively determine or ensure quite sixty compounds of various nature within the packaging materials shows the GC–MS recording for the acetonitrile extraction. Some compounds can be confirmed with the injection, below an equivalent conditions, of the accessible normal comparison the retention time and also the corresponding spectral data; so, getting ready to [\*fr1] (28 compounds) can be absolutely confirmed. The remaining detected peaks were tentatively known because it has been elaborated. solely compounds with the simplest matches ( $\geq 800$ ) were thought-about within the study.

## Conclusions

An approach to estimate dietary exposure to sure chemicals transferred from plastic packaging materials into fatty cereal primarily based foods is conferred. Firstly, a GC–MS technique was developed as a screening tool to spot migrants within the plastic packaging materials. quite sixty compounds of a distinct nature, like plasticizers, antioxidants, slip agents, actinic radiation filters or photoinitiators were detected. solely twenty of sixty five known compounds were enclosed within the positive list of European Regulation 10/2011. Secondly, chosen migrants, namely, 5 phthalates (DEP, DIBP, DBP, DEHP and DNOP), the plasticiser ATBC, the inhibitor BHT and also the actinic radiation filter octocrylene were determined in pooled food samples. The analytical technique showed smart dimensionality ( $R^2 \geq \text{zero.9930}$ ) and a superb sensitivity ( $\text{LODs} \leq \text{zero.01 } \mu\text{g}/\text{mL}$ ). Finally, the exposure assessment was performed; the mean dietary exposures ranged from zero.00282 to 0.545  $\mu\text{g}/\text{kg}$  weight per day reckoning on the analyte, being the best exposure found for DEP within the cluster comparable to 1–2 years. However, calculable exposures all told cases were found to be below the established tolerable daily intakes, once accessible.

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