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## DETERMINATION OF MULTICLASS CONTAMINANTS IN BREAST MILK BY HS-SPME-GC-MS/MS: METHOD DEVELOPMENT AND OPTIMIZATION

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### Highlights

Exposure to pesticides and PPCPs can pose health risks to mothers and babies. An automated, solvent-free HS-SPME-GC-MS/MS method has been developed to determine contaminants in breast milk samples.

### Resumo/Abstract

Breast milk is the main source of nutrition for newborns and infants. The World Health Organization (WHO) recommends exclusive breastfeeding for up to 6 months and supplementary breastfeeding up to 2 years or more. In human milk banks, milk undergoes microbiological quality control to ensure food safety for newborns. However, in Brazil, there are no standardized measures to assess the presence of contaminants in breast milk. Therefore, breast milk can be a potential vehicle for the transfer of contaminants from mother to child, such as pesticides, pharmaceuticals, and personal care products, which have toxic effects on the baby's development, such as neurological, gastrointestinal, and reproductive problems. Therefore, this study aims to develop an analytical method for the determination of emerging contaminants using HS-SPME and GC-MS/MS. Six SPME fibers were evaluated for the extraction of 13 analytes (9 parabens, caffeine, atrazine, bisphenol-A, and benzophenone-3), and polyacrylate was chosen due to its greater response for most analytes. After that, a CCRD 2<sup>3</sup> factorial experimental design was performed, using incubation and extraction temperature, ionic strength, and extraction time as variables. Therefore, the HS-SPME-GC-MS/MS method was performed as follows: 5 mL of sample solution (1:4, sample:water) and 1.5 g of NaCl, fiber conditioning occurs at 250 °C for 30 min, the sample is incubated at 80 °C for 10 min with shaking at 250 rpm, then the fiber is exposed for 80 min at 80 °C and finally desorption occurs for 5 min at 250 °C. The optimized method was validated according to INMETRO and SANTE guidelines. The analytical matrix superposition curves were evaluated by external calibration, showing linearity >0.99 for most analytes. The method's LODs ranged from 0.15 to 0.76 ng mL<sup>-1</sup>, while the LOQs ranged from 0.5 to 2.5 ng mL<sup>-1</sup>. The accuracy and precision showed recovery values ranging from 43 to 120%, with RSD <22% for all analytes. A solvent-free, rapid, accurate, and precise method was developed for the determination of multiclass contaminants using HS-SPME and GC-MS/MS. This method will subsequently be applied to the determination of these compounds in breast milk samples from the city of Rio Grande, RS.

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