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Journal of Chromatography & Separation Techniques

Short Communication

A Virtual Repository of Chromatographic and Mass Spectrometric Methods Used in Food, Pharmaceuticals, and Agriculture

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ABOUT THE STUDY

Chromatographic analysis is commonly used to identify and evaluate potentially toxic substances in agricultural and food products. These techniques can be used to ensure compliance with regulatory standards, but updates are frequently required to reflect current monitoring specifications and advances in analytical instrumentation.

Pesticides and metabolites have been measured using GC-MS/MS analysis on a triple quadrupole system with cool on-column injection [1]. The methodology also explains how to improve the performance of a subset of pesticides by employing a programmable temperature vaporizing injector with a baffled injection linear. Several methodologies for detecting regulated compounds and contaminants in meat systems have also been suggested recently. Because of the complex solid matrix and the presence of interfering compounds, extracting target compounds from meats can be difficult. As a result, new and improved methodologies for identifying and quantifying relevant compounds in these foodstuffs are critical. It is a methodology for detecting 12 food dyes in meat products, with the goal of ensuring regulatory compliance [2].

The method suggests using ultrasound extraction process and offers a single, optimal solvent mixture of colours. The colours in samples of fresh pork and beef, as well as salami and seasoned sausage products, were completely separated using an HPLC-UV/DAD (DAD; Diode Array Detector). This workflow offers a simple sampling method that can clearly identify a variety of colours in a single measurement. Potentially dangerous substances can also be created during the processing or cooking procedures in addition to additives.

For instance, grilled or charred meats may contain heterocyclic amines, which may increase the risk of human cancer and it is a process that combined a selective extraction/concentration procedure with a pressurized, expedited solvent exchange method in methanol [3]. A UHPLC-MS/MS with high-resolution ion trap mass analyzer was used to detect heterocyclic amines that were extracted from either beef or moose meat. Even though there are many techniques for identifying the heterocyclic amines, this method considerably improves extraction efficiency by minimizing time-consuming sample pre-treatments to remove interference molecules.

Another possible pollutant that can damage meat products is ochratoxin A. While contaminated feedstock's can cause bioaccumulation in animal tissues, the most frequent location for this mycotoxin to be found is in cereal grains. It reported an extraction method using Molecular Imprinted Solid Phase Extraction (MISPE) along with High Performance Liquid Chromatography and Fluorescence Detection for porcine muscle, kidney, and liver tissues (HPLC-FLD) [4]. The optimized MISPE column conditioning and regeneration techniques allowed for up to 7 additional uses, and this approach showed great sensitivity and reproducibility and also described a second technology using MISPE purification in conjunction with HPLC-FLD for the identification of Bisphenol A (BPA) in several edible sheep tissues [5].

Due to its estrogen-mimicking qualities, BPA, a common precursor molecule used in polycarbonate plastics and epoxy resins, raises concerns about exposure to free BPA. Although many procedures have been published for the detection of BPA, the adoption of a single-step MISPE approach eliminates the necessity for time-consuming and strenuous pre-treatments. In this article, an optimized SPE method using sheep tissue was described. It was found that up to five cartridge reuse cycles without proper column conditioning did not degrade performance. These two MISPE procedures show the potential to quantify ochratoxin A and BPA in the tissues of different animal species, and they may potentially be pertinent to the study of veterinary toxicity.

Although the aforementioned study offers a way to assess indirect human exposure to BPA through an environmental pathway, direct exposure is typically connected to food packaging materials. In order to evaluate the amount of BPA in a sample of commercial goods packaged in cans, paper boxes, and glass jars, it specifies a straightforward Dispersive Liquid-Liquid Microextraction (DLLME) pre-treatment. For high-throughput sampling, this approach offers a quick and economical concentration protocol with a high BPA recovery and

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Received: 22-May-2022, Manuscript No. JCGST-22-18470; **Editor assigned:** 27-May-2022, PreQC No. JCGST-22-18470(PQ); **Reviewed:** 11-Jun-2022, QC No. JCGST-22-18470; **Revised:** 18-Jun-2022, Manuscript No. JCGST-22-18470 (R); **Published:** 25-Jun-2022, DOI: 10.35248/2157-7064.22.13.487

Citation: Moura J (2022) A Virtual Repository of Chromatographic and Mass Spectrometric Methods Used in Food, Pharmaceuticals, and Agriculture. J Chromatogr Sep Tech. 13: 487.

low limit pollutants that naturally occur have also been discussed. Because rice is used widely worldwide, it is recognized that rice has a higher bioaccumulation of arsenic than other commercial crops. Arsenic's toxicity is affected by its physical form, though, as inorganic forms are more severely hazardous than organic species. In order to preserve arsenic speciation, this method extends a prior microwave-assisted extraction process employed in other food matrices.

CONCLUSION

Individual arsenic species in rice grains were detected and measured using HPLC connected to a Hydride Generator with an Atomic Fluorescence Detector (HPLC-HG/AFS). These methods may be helpful in giving a more thorough assessment of the potential dietary concerns related to arsenic accumulation in rice in different locations of the world.

This methodology including both screening and identifying a wide variety of small molecules are described, along with the most effective protocol for quantifying the relevant antimicrobial compounds. Such procedures illustrated the wide range of difficulties being addressed with chromatographic techniques in the fields of agriculture, food, and health or nutrition and might be utilized to drive innovation and improvements for treatment methods and resource recovery in commercial food waste streams.

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