

TECHNICAL BULLETIN

Testing Various Food/Feed Matrices for Dioxin/Furan and PCB Congeners by HRGCMS and CALUX® Cell-based Assay

Overview

Dioxin/Furan and dioxin-like compounds have been in the environmental spotlight for over two decades. Extensive global research has concluded that exposure to these compounds can result in biochemical and biological effects in animals and humans. Because over 90% of human exposure comes from the food supply, recent regulatory initiatives have focused on monitoring food and animal feed for these harmful contaminants. The World Health Organization (WHO) is a strong advocate of food supply monitoring for these compounds. Toward that end, in the summer of 2002 the European Union (EU) implemented regulations establishing safe levels for dioxin/furan in various food and animal feed matrices. It is the EU's stated intention to add the 12 WHO listed PCB Congeners to these regulations in 2004. To date, the most accurate and consistent means of testing for dioxin and PCB's at ultra low levels, has been by HRGCMS methodology. Because of its outstanding record of performance, HRGCMS is the methodology of choice endorsed by virtually all, regulatory organizations around the world. Recent advances in cell-based assay technology have enabled the CALUX® Assay to earn EU approval, when used as a screening method for dioxin, in conjunction with confirmatory HRGCMS testing.

Dioxin Analysis by HRGCMS

Most food/feed testing for Dioxin/Furan is performed by HRGCMS utilizing USEPA Method 1613B. This method determines and quantifies the presence of the seventeen Polychlorinated Dibenzop-dioxins and Polychlorinated Dibenzofurans that have been identified by the WHO as being toxic to humans and animals. Reporting limits in food, range from .4 to 4.0 pg/gm fat WHO TEQ, and in feed from .4 to 4.5 ng/kg WHO TEQ, as stipulated by the EU guidelines

PCB Analysis by HRGCMS

Twelve congeners of the Polychlorinated Biphenyls (PCB's) family have been identified by the WHO as being dioxin-like in nature and therefore suspected or known carcinogens, and a similar list has been defined by the USEPA. These compounds can be analyzed by HRGCMS utilizing USEPA Method 1668, which will determine the presence of and quantify the amount of these targeted contaminants. Reporting limits in food are currently 50 ng/kg with DL's in the .01 to .1ng/kg range.

CALUX® Assay

CALUX® uses the latest advancements in biotechnology to offer accurate and cost-effective screening analysis for Dioxins, Furans and PCB's, providing a yes/no response to the presence of this family of persistent organic pollutants (POP's). In developmental testing CALUX® exhibited a strong correlation in side-by-side tests with HRGCMS methodology. In meeting the requirements of EU guidelines for dioxin screening methods CALUX® exhibits less than 1% false negatives, and detection limits of approximately 3X the background response. To insure screening accuracy and provide quantitative results for individual target compounds, confirmatory HRGCMS analysis should be run on all positive screen results. Additionally, to support data correlation, some percentage of negative results between 2 and 10%, should also be subjected to confirmation testing. The CALUX® Assay can be utilized to screen large numbers of time critical food and animal feed samples for dioxin/furan and/or PCB's, in a more cost effective and timely manner than traditional HRGCMS testing methods.