

Analysis of furan by GC/MS

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The furan is a small organic molecule (MW=68) that can be found in food and feed, and classified as possibly carcinogenic to humans by the IARC (group 2B). Furan has been identified in a number of foods that undergo heat treatment such as canned and jarred foods. The pathways of formation are not yet well known and includes several mechanisms such as Maillard reaction, carbohydrate thermal decomposition, amine decarboxylation-reduction, ...

The final purpose of our project is to provide a quantitative risk assessment associated to the ingestion of furan by the Belgian population. The occurrence data in food are then mandatory to set up a database. To achieve these goals, the development of quantitative analytical methods is required. Based on the literature currently available, gas chromatography (GC) connected to mass spectrometry (MS) is the method that fits with the necessary sensitivity and specificity (ppb level in food). The volatility of furan (P_{sat} : 477 mm Hg at 20°C; bp : 33 °C) allows an easy transfer in gas phase at low temperature thermal treatment and, in some cases, with an additional chemical treatment. The use of gas phase extraction technique like headspace or solid phase microextraction (SPME) is ideal for this kind of compound and can be hyphenated with GC/MS in an integrated analysis method. Isotopic dilution technique (ID) with deuterated furan (furan d-4) is used to quantify samples. Optimization and validation of the method is performed using an experimental design program.