

Total Fat Extraction of Hot Dogs and Potted Meat



Abstract

The extraction of fat from food is crucial in the food industry for product formulation and because food labels must report both saturated and unsaturated fat content. Furthermore, educated consumers want to know what is in their food and pay particular attention to the fat content. In an industry with lots of quality control and that is increasingly becoming more consumer driven, time becomes a critical factor. Food manufacturers are burdened with additional testing before product release, making speed of analysis a critical factor. In this application note, EDGE™ with its patent pending, Q-Cup Technology can extract total fat from hot dogs and potted meat in less than 5 minutes.

Introduction

Total fat extraction can be a challenge due to the potential of the fat being entrapped by the matrix. Traditional methods, such as soxhlet, have been found to be effective; however, they require lots of time, use lots of solvent, and are destructive to the sample. In the demanding food industry there is a huge need to determine fat content quickly and safely.

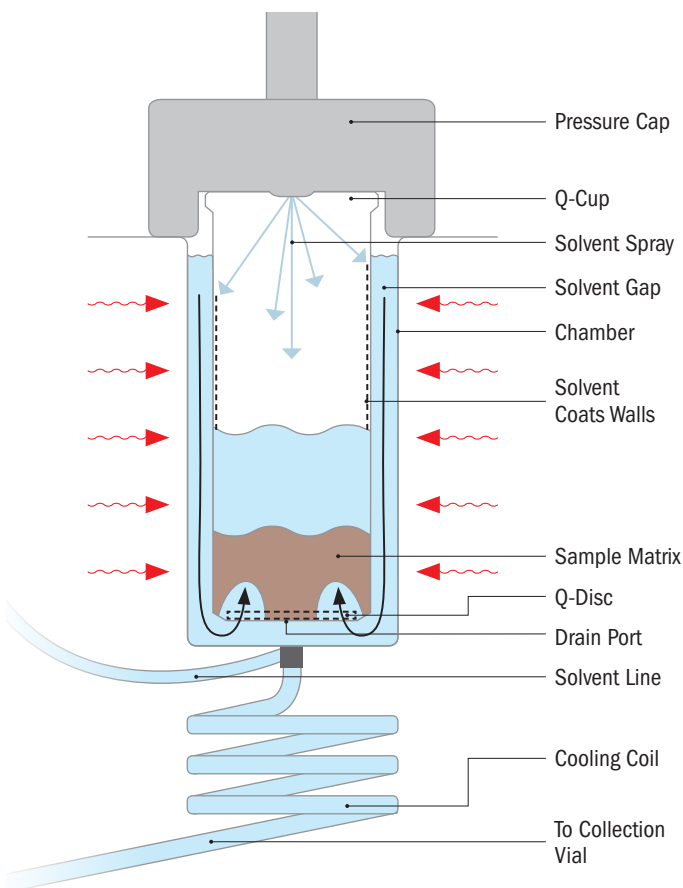
Beyond the food labeling needs, analyzing for food contaminants is increasingly important. When analyzing for food contaminants there is often a need to further process a sample after fat extraction. Most traditional methods destroy the sample during the fat extraction making further processing impossible. With EDGE, the fat extraction from hot dogs and potted meat is completed in under 5 min. The EDGE process is non-destructive and the extracted sample is ready for further analysis. Included in the run time is the extraction, filtration, cooling and washing process.

Instrumentation

The EDGE uses Q-Cup Technology that combines the process of Pressurized Fluid Extraction and Dispersive Solid Phase Extraction in one instrument that yields rapid and efficient extraction. The easy-to-assemble Q-Cup™ sample holder offers a unique open cell concept that creates a dispersive effect and promotes rapid extraction and filtration. The result is fast, simple and efficient extractions.

Sample preparation in the EDGE could not be easier. Simply place a Q-Disc™ into the Q-Cup base and screw the two parts together. Add any sands or drying agents if needed and then add the sample. Food samples can be wet or dry and as large as 5 g. The EDGE will use only 40 mL of solvent per extraction, which includes solvent for diffusive extraction and sample rinse. Cleaning of the system can take up to an additional 30 mL of solvent. The rapid heating of the extraction chamber in combination with diffusive action allows a temperature of up to 180 °C to be achieved in less than 2 minutes.

Figure 1: The EDGE Process



Sample is Loaded

The Q-Cup is automatically loaded into the chamber by the auto sampler. The pressure cap then creates a pressurized seal on the top of the Q-Cup.

Solvent is Extracted

Solvent is first added through the bottom to fill the gap between the chamber and Q-Cup, this aids in heat transfer. Then, solvent is added through the top of the Q-Cup to wet the sample.

As the chamber walls are heated, the pressure in the gap increases. This overcomes the pressure inside the Q-Cup, forcing the solvent to disperse into the sample.

Extract is Collected

Once the sample reaches temperature, the solvent is dispensed through the Q-Disc, the cooling coil, and into a collection vial.

Procedure and Method

The hot dog and potted meats samples were homogenized in a grinder and then dried in an oven at 120 °C for 1 hour. 1 g samples of hot dogs or potted meat were mixed with 1 g of sand and then added to an assembled Q-Cup containing a Q-Disk. The Q-Cups were placed in the EDGE removable rack each with a collection vial and the rack was slid into place on the EDGE. The One Touch Method™ for total fat was used. The extracts were transferred to pre-weighed centrifuge tubes and dried in a Genevac EZ-2 Plus. The dried samples in the centrifuge tubes were weighed to determine total fat.

Samples

Nathan's Famous skinless beef franks and Armour potted meat were purchased from a local grocery store. Samples were mixed with sand obtained from Sigma Aldrich. Samples were extracted via the EDGE and soxhlet. Petroleum ether was used as the extraction solvent. The system was washed with Petroleum ether and water.

Results and Discussion

The EDGE, using Q-cup technology, yielded comparable results to soxhlet for the total fat extraction of hot dogs and potted meat in under 5 minutes. **Figure 1** shows the recovery data compared to soxhlet for the extraction of fat from hot dogs and potted meat. With the EDGE total fat of hot dogs and potted meat was determined quickly using minimal solvent in a one-step simple process. Furthermore, the samples were not destroyed and, if necessary, could be further processed.

Results and Discussion

The EDGE, using Q-Cup technology, yielded comparable results to soxhlet for the total fat extraction of hot dogs and potted meat in under 5 minutes. **Figure 1** shows the recovery data compared to soxhlet for the extraction of fat from hot dogs and potted meat. With the EDGE total fat of hot dogs and potted meat was determined quickly using minimal solvent in a one-step simple process. Furthermore, the samples were not destroyed and, if necessary, could be further processed.

Table 1: Recovery data for the extraction of fat of hot dogs and potted meat versus soxhlet

Sample	% Recovery versus Soxhlet
Hot Dogs	98
Potted Meat	104

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