

PATsmart™ ZipChip® System and Detergents

Application Note

Repligen Corp. now owns the life sciences PAT product portfolio of 908 Devices Inc. Please contact Repligen for further inquiries.

Overview

Detergents are often a necessary but troublesome part of protein analysis. They help keep proteins stable and soluble but can wreak havoc on analytical instrumentation. Detergent contamination in chromatography systems and mass spectrometers is a costly and time-consuming problem. Additionally, removing detergents from protein samples risks destabilizing the molecules or introducing artifacts. A major benefit of PATsmart™ ZipChip® System analysis is that it is tolerant of many commonly used detergents, making detergent removal unnecessary.

ZipChip Analysis of Protein Samples Containing Detergents

In addition to contaminating analytical instrumentation, the resulting data is affected by the presence of detergents in the sample. Figure 1 shows the mass spectra from a reversed-phase liquid chromatography mass spectrometry (RPLC-MS) analysis of a protein sample containing 0.5% of the detergent, NP-40. The charge envelope of the protein (cytochrome c) is visible in the data but is obstructed by the NP-40 charge envelope. This interference makes protein identification difficult and impacts the overall sensitivity of the measurement. Figure 2 shows the mass spectrum from ZipChip analysis of the same protein sample containing 0.5% NP-40. The charge envelope of cytochrome c is easily observed and there is no interference from NP-40. The mass spectrum can be easily processed to identify and characterize the protein and the sensitivity of the assay is not impacted by the detergent in the sample.

Non-ionic and anionic detergents and denaturing reagents will not migrate through the channels of the ZipChip to the electrospray emitter. This makes ZipChip tolerant to a wide variety of commonly used reagents for protein stability and solubility. Figure 3 shows mass spectra generated from ZipChip analysis of proteins samples containing common additives. In all cases, interference from detergent molecules is not observed in the data, and clean, high quality mass spectra are obtained.

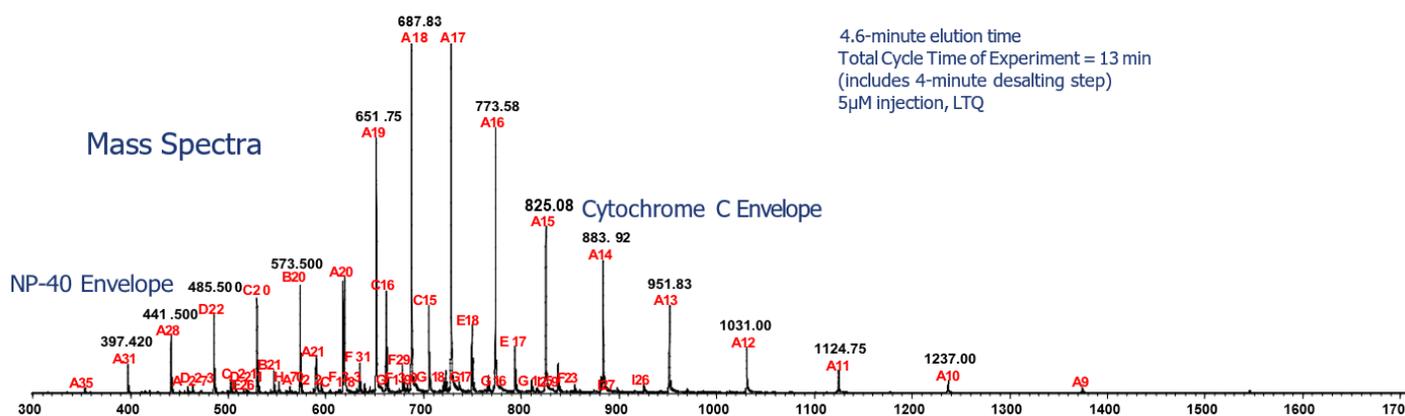


Figure 1. RPLC-MS analysis of a cytochrome c sample containing 0.5% NP-40. The MS signal from the detergent obstructs the protein envelope, complicating data analysis and reducing sensitivity.

Summary

ZipChip is compatible with many detergents commonly used with protein analysis. Non-ionic and anionic detergents do not migrate to the electrospray emitter so there is no need to remove them prior to analysis. Samples can be analyzed directly from formulation buffer and remain in a stable

solution until analysis. For samples containing detergents, ZipChip is a fast and easy way to get superior intact protein MS data.

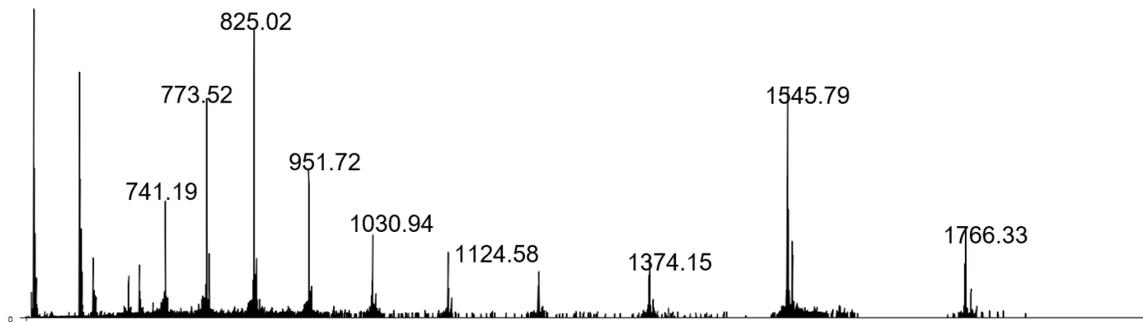


Figure 2. ZipChip analysis of the same cytochrome c sample containing 0.5% NP-40. The detergent molecules do not interfere with the analysis and a clean, intact protein mass spectrum is obtained.

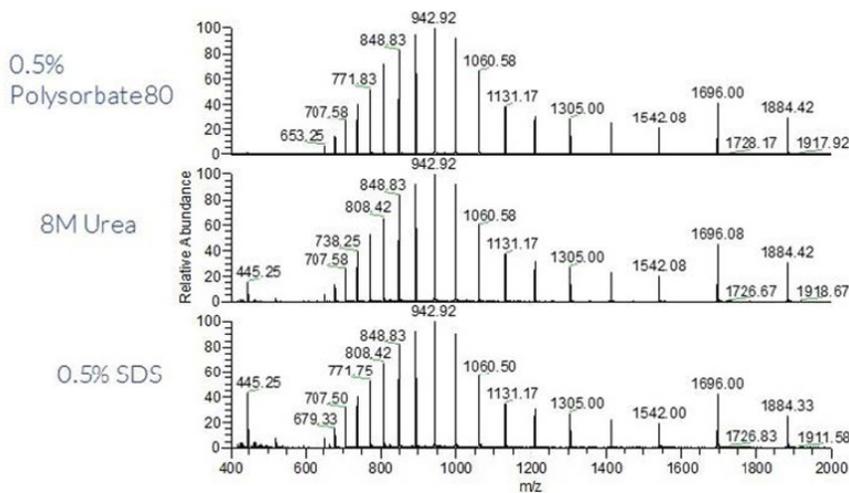


Figure 3. ZipChip analysis of intact protein samples containing commonly used detergents and denaturing reagents. In all cases, a clean intact protein mass spectrum is obtained without utilizing sample cleanup steps prior to analysis.

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