Things to avoid in Mass spectrometry (MS)

Mass spectrometry (MS) uses very sensitive mass spectrometers and not all chemicals are MS compatible. Some can harm the instrument, e.g. corrosive chemicals, inorganic acids and alkali-metal bases and salts; others induce ion suppression, leading to dwarfed or no peaks. Detergents and polymers are the main source of ion suppression and have to be avoided, even the smallest traces. Detergent contamination of a mass spectrometer is very costly (ruined columns/tubing) and very time consuming to the laboratory. Usually, detergents cannot be washed out of samples completely. For most of the protocols, there are mass spectrometry compatible versions. Some buffers even contain undeclared substances. Other chemicals can modify peptides and introduce artificial modifications and should therefore be avoided, (e.g. methanol can introduce artificial methylation sites).

Please note that samples containing non-ionic detergents or high alkaline salt will not be accepted under any circumstances (eg: Tween-any, Triton-any, NP-40, EDTA, Glycerol). All samples must be desalted prior to submission to the facility (protocols available upon request or download from KMS website). If number of samples is not overwhelmingly large - KMS can perform sample desalting for you.

Below is a list of compatible/incompatible detergents for in-solution or in-gel digestions.

In-solution Digestion

Compatible Detergents:

0.05%-1% SDS

0.05%-0.5% CHAPS

Incompatible Detergents:

Nonidet P-40 (which can no longer be purchased; Sigma is substituting CA-Igepal 630)

Triton® X-100 (or any derivative)

Igepal/PEG (any derivative)

Brij®-35 (or any derivative)

Tween®-20

OTG

CHAPSO

Type NP40/NP40 alternative

In-gel Digestion

Compatible Detergents:

SDS (up to 2%)

CHAPS (up to 4%)

Nonidet P-40 (up to 1%); which can no longer be purchased; Sigma is substituting CA-Igepal 630

Incompatible Detergents:

Triton® X-100 (or any derivative)

Tween®-20

Igepal/PEG (any derivative)

Brij®-35 (or any derivative)

OTG

CHAPSO

Type NP40/NP40 alternative

Some detergents can be separated from the sample by standard SDS-PAGE or acetone precipitation. **However, Triton-X and Tween-20 cannot be used under any circumstances. These cannot be removed from your sample using dilution, washing, detergent spin columns, or SDS-PAGE.**

We are happy to help you develop a mass spec friendly sample preparation protocol.

General guidelines for protein extractions:

- Work in a clean environment, protect samples from skin /wool keratin and dust.
- Wear gloves, close tubes, tip boxes after use.
- Keep sample storage and processing time as short as possible.
- Keep sample on ice if non-denaturing buffer is used and use protease/phosphatase inhibitors.
- Use LoProtein binding tubes/plastic ware.
- As some proteins/peptides bind to glass/plastic ware, use as less protocol steps as possible.
- Measure protein content (usually 10- 50 µg of protein extract is required, for PTM.
- Avoid longer storage of samples in fridge, freeze (-80°C) proteins if it needs to be stored for more than a day.
- Avoid any kind of detergents (e.g. NP-40).
- Do not use plastic materials for preparing or storing LC-MS solvents.
- Do not use Parafilm™ to seal LC-MS solvent bottles.