

Minimizing Contamination in Mass Spectrometry and Proteomic Experiments

Many common laboratory chemicals used in biochemical and molecular biology research can significantly interfere with mass spectrometry experiments causing signal loss and can contaminate the instruments. The two biggest culprits are PEG and keratin.

Polyethyleneglycol (PEG)

PEG is everywhere! It is strongly ionized but ESI or MALDI and can swamp out signal from the analyte of interest. PEG has a common repeat of 44 Da in mass spectrum. Many detergents contain PEG including dish-washing soaps. Triton X-100, Tween, NP-40 are pegylated detergents and should be avoided. PEG is also used to coat Chem-wipes so if you are wiping down your lab bench/glassware etc with chem wipes you are smearing PEG everywhere.

Removal of PEG for small molecules is very difficult and the best approach is to just avoid it (see tips below). If these detergents are used for protein samples the best way to remove them is by SDS-PAGE. Trace amounts of PEG can ruin a mass spec experiment. And when I say trace I mean trace and even less than what you think trace.

- Glassware previously used to make buffers can be contaminated with PEG. Keep glassware used for buffers separate from non-buffer making glassware.
- Dish wash soap contains PEG. Either do not use or rinse glassware with very hot water followed by an organic solvent rinse (like IPA).
- Use only HPLC grade solvents
- Do not store organic solvents in plastic tubes. PEG contaminants can leach out of plastic tubes. Use new glass bottles or disposable glass scintillation vials (with Teflon lids)
- We recommend Eppendorf brand microcentrifuge tubes.
- Use disposable pipettes. Pipettes that have been used to pipette buffers are contaminated.
- Avoid siliconized surfaces or plastic ware. We observe polysiloxanes (repeat of 76 Da).

Keratin

Keratin is a common protein contaminate. Keratin originates from skin and hair but is present in dust in the lab.

- Any surface in the lab including glassware, reagents, chemicals exposed to the lab atmosphere for more than a few minutes will be contaminated with enough keratin to be detected by mass spec sequencing. Wash everything with organic solvent (IPA) before use and keep everything covered with foil, or in sealed plastic bags or bottle caps. Anything left to dry at the side of the sink is contaminated with keratin.

- SDS-PAGE – We strongly recommend that you use pre-cast gels (NuPAGE from Invitrogen) and use ready made buffers, loading dye etc. However, if using premade buffers, take care not to contaminate your buffer stock with contaminated pipettes.
- Gel tanks are a common source of keratin contamination.
- Always wear gloves and change them frequently. If you answer the phone or pick up a pen with your gloves on, your gloves are now contaminated.
- Working in a laminar flow hood will help minimize dust and keratin but not eliminate it if your glassware is dusty.
- When staining your gel cover with the tray with foil or wrap at all times. Be sure to wash the staining dish well (rinse with IPA)
- Communal lab chemicals (loading buffer, lab buffers etc) are the most common sources of keratin. Do not use – make fresh every time.