

Optimized evaporation in oligonucleotide sample preparation

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Evaporation is often used during preparation of oligonucleotide samples before LC-MS/MS to remove excess solvents, buffers, or volatile reagents. By concentrating the sample and exchanging it into a more MS-friendly solvent, evaporation can improve analytical sensitivity and ensure more consistent and reliable detection of oligonucleotides during analysis.

However, incorporation of evaporation as part of the sample preparation workflow for oligonucleotides can be problematic and time consuming. Some oligonucleotide species are particularly prone to non-specific binding to the surface of vials or plates reducing recovery, reproducibility and assay sensitivity. This has historically limited the use of evaporation in oligonucleotide workflows despite its potential benefits.

Optimized evaporation conditions

When evaporation is performed under controlled, optimized conditions using high-purity plates or vials, the process becomes robust and reliable, and sample losses are minimized. Typically, 96 x 500 µL sample extracts can be evaporated in approximately 30-60 minutes. The parameters that have been validated for oligonucleotide evaporation using TurboVap® 96 Dual include maintaining a temperature of 60 °C, and a gas flow of 60 L/min, and with Biotage® Oligo SPE plates. Samples should be evaporated to near-dryness and reconstituted in a solvent that is compatible with the chromatographic system used shortly after to avoid prolonged exposure to dry conditions.

Validation results

Figure 1 shows the minimal impact on recovery associated with evaporation (comparing analyte spiked pre-and post-evaporation), for analyte spiked into elution solvent (blue) and analyte extracted from plasma samples (orange), for a panel of oligonucleotides with a range of characteristics. Samples were evaporated using TurboVap® 96 Dual using optimized temperature and gas flow conditions.

Evaporation losses

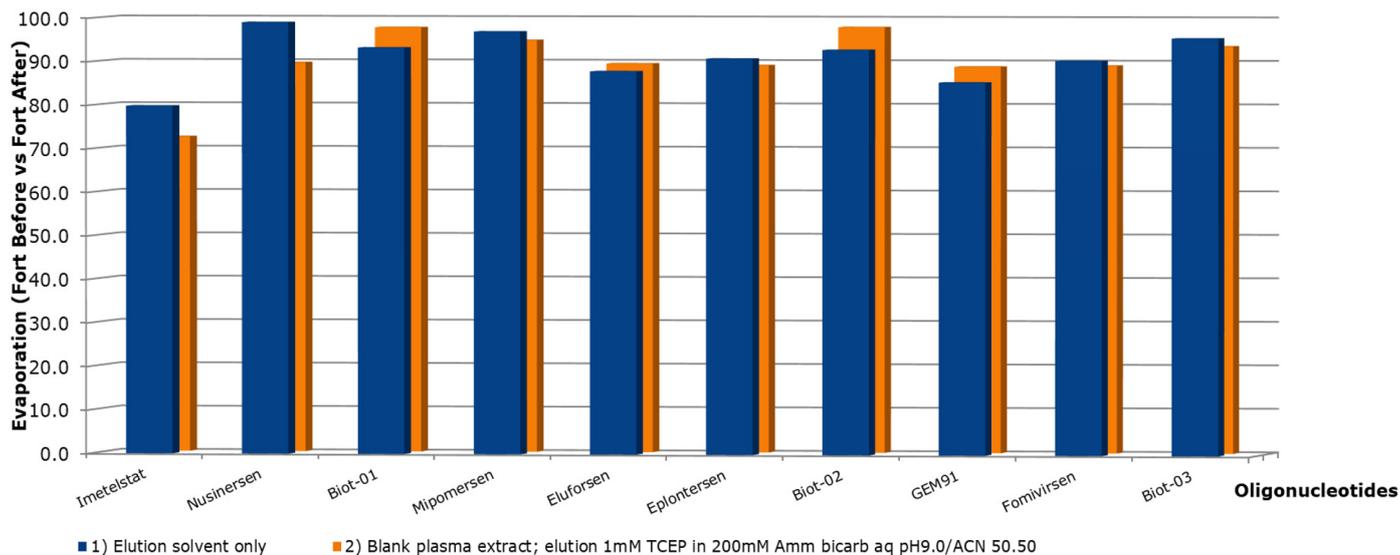


Figure 1. Impact of evaporation on recovery of a range of oligonucleotide species using TurboVap® 96 Dual.

TurboVap® 96 Dual and TurboVap® LV

For samples in 96-well plate or tube format TurboVap® evaporation systems offer easy to use, accurately controlled evaporation. Intelligent evaporation technology achieves rapid and consistent evaporation while reducing gas consumption.

TurboVap® 96 Dual can dry two 96-well plates simultaneously, providing high throughput for parallel processing, while TurboVap® LV provides flexibility for up to 48 samples in a range of tube formats. Both systems provide the precise temperature and gas flow control necessary for reproducible oligonucleotide evaporation.

When incorporating evaporation into oligonucleotide workflows, the complete sample preparation process should be considered. Biotage® Oligo SPE products use mixed-mode weak anion exchange (WAX) chemistry for oligonucleotide extraction and cleanup from biological samples. Both plates and cartridges are available in 10 mg, 30 mg, and 80 mg formats to accommodate different sample types and volumes.

Conclusion

When controlled, optimized evaporation conditions are used with appropriate labware, evaporation is a robust and reliable sample preparation step for oligonucleotide analysis. The validated conditions presented here provide high, consistent recovery with minimal evaporation losses across diverse oligonucleotide types, enabling high-throughput processing of 96 samples in approximately 30-60 minutes. Evaporation improves LC-MS/MS sensitivity through sample concentration and solvent exchange while maintaining the reliability required for routine analytical workflows.



TurboVap® LV



TurboVap® 96 Dual

Ordering information

Biotage® Oligo SPE products

Product number	Description	Qty
654-0002-LVP	Biotage® Oligo SPE 2 mg μ elution plate	1/pk
654-0010-PX01	Biotage® Oligo SPE 10 mg plate	1/pk
654-0030-PX01	Biotage® Oligo SPE 30 mg plate	1/pk
654-0080-PX01	Biotage® Oligo SPE 80 mg plate	1/pk
654-0001-AXG	Biotage® Oligo SPE 10 mg/1 mL (Tabless)	100/pk
654-0003-AXG	Biotage® Oligo SPE 30 mg/1 mL (Tabless)	100/pk
654-0008-AXG	Biotage® Oligo SPE 80 mg/1 mL (Tabless)	100/pk
654-0008-BXG	Biotage® Oligo SPE 80 mg/3 mL (Tabless)	50/pk

SPE accessories

Product number	Description	Qty
121-5203	Collection Plate, 2 mL, square	50/pk
121-5204	Pierceable sealing cap	50/pk

Evaporation

Product number	Description	Qty
418000	TurboVap® 96 Dual	1
415408SP	TurboVap® LV Manifold (48 Nozzles)	1



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Literature Number: TN202

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