

# SavilleX Technical Note

## Using the DST-4000 for On-Demand High Purity Acid Production

### Summary

SavilleX's DST Acid Purification Systems are used by labs worldwide for the on-demand production of high purity acid for use with ICP-MS and other metals analysis techniques. An upgraded version of the original model, the DST-4000 is a high throughput, fully automated system capable of producing 4 L of high purity acid at a time, completely unattended.



*SavilleX DST-4000 Acid Purification System*

### High Quality, High Throughput Production

The ultra-low detection limits of ICP-MS necessitate the use of high purity grade acids for standards, sample dilutions and, increasingly, even for sample digestion. Although commercially available bottled high purity (10 ppt grade) acid is readily available, it costs up to ten times more than trace metal (1 ppb) grade acid. Once opened and during use, a bottle of high purity acid can easily become contaminated due to airborne contamination and/or analyst error. For these reasons, many labs are producing their own high purity acid using the SavilleX DST-1000 Acid Purification System. The DST-1000 produces  $\text{HNO}_3$ ,  $\text{HCl}$ , and  $\text{HF}$  that are as high in quality or higher than commercially available acids (Table 1). It is also easy to use, has a small footprint, and can pay for itself in months – or even weeks – depending on the laboratory's acid needs.

Although in-lab production of high purity acid can easily be justified financially, some laboratories prefer to continue to purchase bottled high purity acid. This is due to the fact that previously, there was no system that could either produce enough acid to meet their needs or be operated completely unattended (thus requiring additional labor). To further address this need, SavilleX released the upgraded DST 4000 Acid Purification System. The quality of acid produced by the



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new DST-4000 is the same as the DST-1000, however, the DST-4000 can produce 1 L of acid in 12 hours – double the throughput of the DST-1000.

### Unattended Acid Purification

In addition to higher throughput, the DST-4000 has several other enhanced features (Table 2). Acid (up to 4 L at a time) is simply added via a front fill tube. A temperature setting between 40°C and 90°C is programmed into the external digital controller offering precise control of the production rate. The maximum temperature is well below the boiling point of the acid, eliminating potential transport of contaminants along with the distillate.

The DST-4000 combines an acid-level sensor with auto-shutoff to switch the heater off when distillation completes – allowing for true walk-away operation. High purity acid is collected in a pair of 2 L Savillex PFA lab bottles fitted with specially designed closures to protect the acid from the environment, ready for use when needed. The in-lab production of high purity acid has never been easier or more convenient.

**Table 1:** Comparison of selected key elements in DST-1000 produced HNO<sub>3</sub>, HCl, and HF using a single distillation from trace metal grade (1 ppb) vs. commercially available high purity grade (10 ppt) bottled acid. All data is in ppt.

Element	Detection Limit (ppt)	Bottled High Purity Grade HNO <sub>3</sub> (ppt)	DST-Produced HNO <sub>3</sub> (ppt)
Na	1	1	<1
Mg	1	2	<1
Al	1	1	<1
K	1	<1	<1
Ca	1	<1	<1
Cr	1	5	1
Fe	1	7	4
Cu	1	1	4
Zn	1	<1	1
Pb	1	<1	<1

Element	Detection Limit (ppt)	Bottled High Purity Grade HCl (ppt)	DST-Produced HCl (ppt)
Na	1	1	7
Mg	1	<1	<1
Al	1	1	6
K	1	<1	2
Ca	1	2	4
Cr	1	5	3
Fe	1	20	17
Cu	1	1	4
Zn	1	7	1
Pb	1	<1	<1



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Element	Detection Limit (ppt)	Bottled High Purity Grade HF (ppt)	DST-Produced HF (ppt)
Na	1	1	6
Mg	1	2	<1
Al	1	8	6
K	1	3	3
Ca	1	9	2
Cr	1	1	3
Fe	1	1	9
Cu	1	<1	2
Zn	1	2	3
Pb	1	<1	<1

**Table 2:** Features of the Savillex DST-1000 and DST-4000 Acid Purification Systems.

Feature	DST-4000	DST-1000
Capacity (L)	4	1
Production Rate (mL/hr)	82	38
Front Fill Tube	✓	✓
Digital Controller	✓	
Auto Shut Off	✓	
Self-Serviceable	✓	✓
Small Footprint	✓	✓
Acid Quality (10 ppt)	✓	✓



*\*Average combined production rate of HF, HCl, and HNO<sub>3</sub>.*

*DST-1000 (left) and DST-4000 (right)*

[Click here to learn more about the DST-4000 and buy online.](#)



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