Savillex Life Sciences
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Improving Geochemical Data Quality with Savillex DST Acid Purification Systems

CASE STUDY

Savillex DST-4000

BACKGROUND

One of India's oldest and most prestigious research institutions, the **Indian Institute of Science (IISc)** is widely regarded as the nation's flagship center for fundamental and applied science. Within IISc's **Centre for Earth Sciences,** Associate Professor **Dr. Sambuddha Misra** leads a research group focused on chemical oceanography and low-temperature isotope geochemistry.

The laboratory—supporting **eight PhD students and three postdoctoral fellows**—is equipped with advanced analytical instrumentation, including an **Agilent 5800 ICP-OES,** an **Agilent 8900 QQQ-ICP-MS,** and a **Thermo Neptune MC-ICP-MS.** As is the case with any high-throughput geochemistry laboratory, the group relies heavily on high-purity acids for sample preparation, cleaning, and analysis.

This case study highlights how the IISc Earth Sciences group meets its substantial demand for high-purity acid by producing its own in-house using **Savillex® DST acid purification systems.**

MEETING THE DEMAND FOR HIGH-PURITY ACID

Geochemistry laboratories consume significant volumes of high-purity acids—and the IISc Earth Sciences group is no exception. Typical monthly usage includes approximately:

- **10 L of HCl**
- **15 L of HNO_3**
- **0.1 L of HF**

HCl and HF are used extensively for cation exchange column chemistry, while HNO_3 and HF serve as sample matrices for ICP-MS analysis. All three acids are critical for sample digestion workflows.

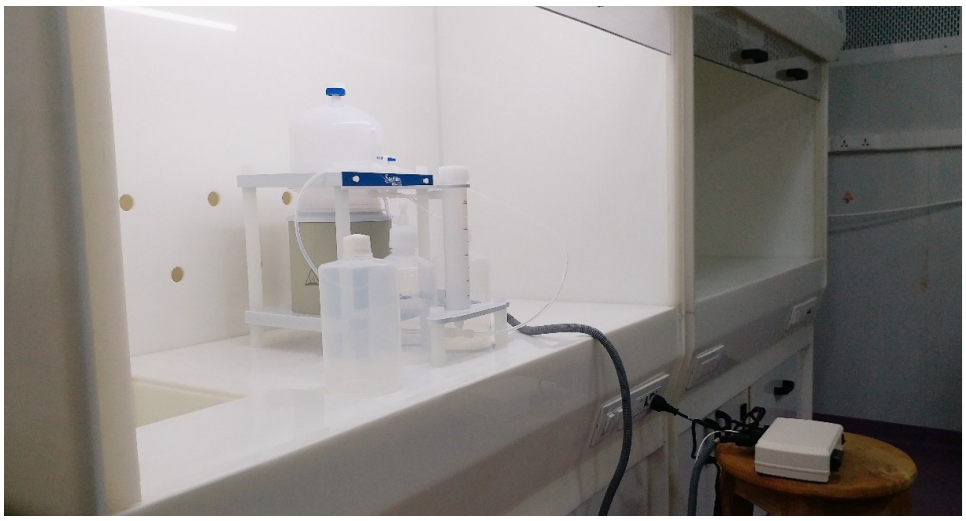
To meet this demand, the lab operates **three Savillex DST systems:**

- **Two DST-4000 systems** (dedicated to HCl and HNO_3)
- **One DST-1000 system** for HF

Beyond throughput, **acid purity is paramount.** For ultra-trace isotope work, the group requires **10-ppt-grade acid or better** to achieve the ultra-low procedural blanks that are necessary for reliable data.

"The DSTs are ridiculously good—I swear by them," says Dr. Misra. *"I have used DST systems since buying my first unit at the University of Cambridge in 2012. Before that, I relied on quartz-distilled HCl and HNO_3, and Optima-grade bottled HF. The quality of DST-produced acid relative to the cost is exceptional."*

Dr. Misra's research involves isotope ratio measurements at **high-nanogram levels for Mg, single-digit nanogram levels for B,** and **sub-nanogram levels for Li and Pb,** where reagent purity can make or break analytical success.



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MINIMAL MAINTENANCE, RELIABLE OPERATION

Despite heavy use, DST systems require **very little routine maintenance.** The only periodic service is replacement of the heater element:

- **HCl system:** approximately every **three years**
- HNO_3 and HF systems: approximately every **five years**

Replacement is straightforward and can be performed by laboratory staff in-house. From a cost perspective, a replacement heater element costs roughly the same as **one to two 500 mL bottles of commercially available 10-ppt-grade acid.**

Aside from heater replacement, the DST systems require **no routine maintenance,** minimizing downtime and long-term operating costs.

SIGNIFICANT COST SAVINGS

Most DST users begin with **trace-metal-grade (~1 ppb) acid** and reach **10-ppt-grade purity** with a single distillation. Because 1-ppb-grade acid costs roughly **one-tenth** as much as commercially bottled 10-ppt-grade acid, DST systems typically pay for themselves quickly.

At IISc, savings are even greater. The lab starts with **lower-cost reagent-grade acid,** which is **double-distilled** to reach 10-ppt-grade purity.

"The DSTs have saved us an enormous amount of money," explains Dr. Misra. *"We can buy 4 L of reagent-grade acid for about $50 and double-distil it to produce around 3 L of ultra-high-purity acid that is commercially priced at over $1,000 per liter. As a result, the facility is saving approximately $10,000–15,000 per month, which is outstanding."*

EXCEPTIONAL ACID QUALITY AND PERFORMANCE

While cost savings are substantial, **acid quality remains the primary driver** of DST adoption in the IISc lab.

"The DST-produced acid allows us to achieve procedural blanks at femtogram- to picogram-level concentrations," says Dr. Misra. *"For HF, we measure boron isotopes in a 1% HF matrix and target sub-millivolt matrix blanks on the multicollector ICP-MS."*

Dr. Misra has also used DST systems to distill water for boron isotope analysis: *"Some of the lowest blanks for boron and lead that I have ever achieved were using DI water further purified with the DST."*

ABOUT DR. SAMBUDDHA MISRA

Dr. Misra (center) with PhD students Satya Chanakya (left – now postdoc at Univ. of Cambridge) and Pratyusha Chanda (right – now postdoc at Univ. of Oxford)

Dr. Sambuddha Misra is an Associate Professor at the Centre for Earth Sciences, Indian Institute of Science (2017–present). He earned his PhD at the National High Magnetic Field Laboratory, Florida State University (2005–2010), followed by postdoctoral and research positions at the University of Cambridge (2011–2017).

Dr. Misra's research focuses on lithium, boron, magnesium, and heavy metal isotopes to study silicate weathering, ocean chemistry, carbon cycling, and paleoclimate reconstruction. He currently serves as an Associate Editor of *Geochimica et Cosmochimica Acta* while also mentoring eight PhD students and three postdoctoral fellows.

SAVILLEX DST SYSTEMS OVERVIEW

Savillex DST acid purification systems are trusted worldwide for producing ultra-high-purity acids for trace and ultra-trace analytical applications. Designed specifically for geochemistry, isotope laboratories, and advanced analytical workflows, DST systems use sub-boiling distillation to dramatically reduce metal and ionic contamination.

Key benefits include:

- Production of **10-ppt-grade acid or better** from lower-cost feedstock
- Compatibility with common mineral acids, including **HCl, HNO_3, HF, and water**
- Chemically inert construction for maximum purity
- Proven performance for ICP-MS, MC-ICP-MS, and ultra-trace isotope analysis
- Minimal maintenance and long service life

By enabling laboratories to produce reproducible, ultra-clean reagents in-house, Savillex DST systems help scientists achieve lower blanks, higher confidence data, and significant long-term cost savings.

Click here to visit the Savillex website and learn more about our DST acid purification systems.