



prepFAST 3 *1,000× Dilution*

Extending single-stage
inline dilution capabilities
for ICPMS and ICPOES



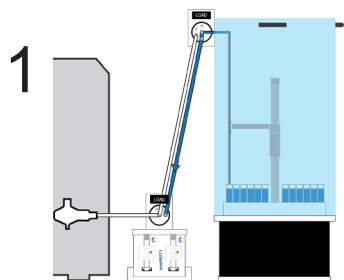
Author: Stasia Vannoni

prepFAST 3's New Extended Autodilution Range for Uninterrupted Analysis

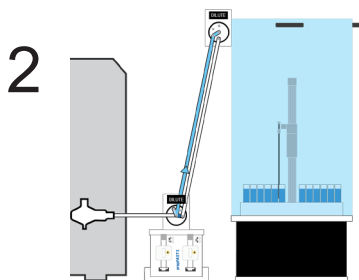
Synopsis

prepFAST 3 automates ICP and ICPMS dilutions, now extending well beyond the original 400x limit. With integrated LabSymphony software, dilution factors up to 1000x are achieved in a single step, ensuring that almost all over-range samples can be accurately diluted within calibration limits without manual preparation or workflow disruption. Samples may be automatically analyzed undiluted or at any dilution

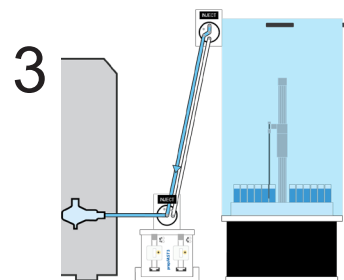
factor, from <2x up to 1000x, with high accuracy. To verify performance at high dilution factors, the prepFAST 3 executed 18 hours of continuous, unattended operation, completing more than 500 dilutions in the 500x to 1000x range with stable and precise performance. This removes concerns about dilution factor limitations in automated workflows, enabling reliable, uninterrupted analysis.



1
Load Sample or Standard
into Dilution Line



2
Syringe Dilute into Sample Line



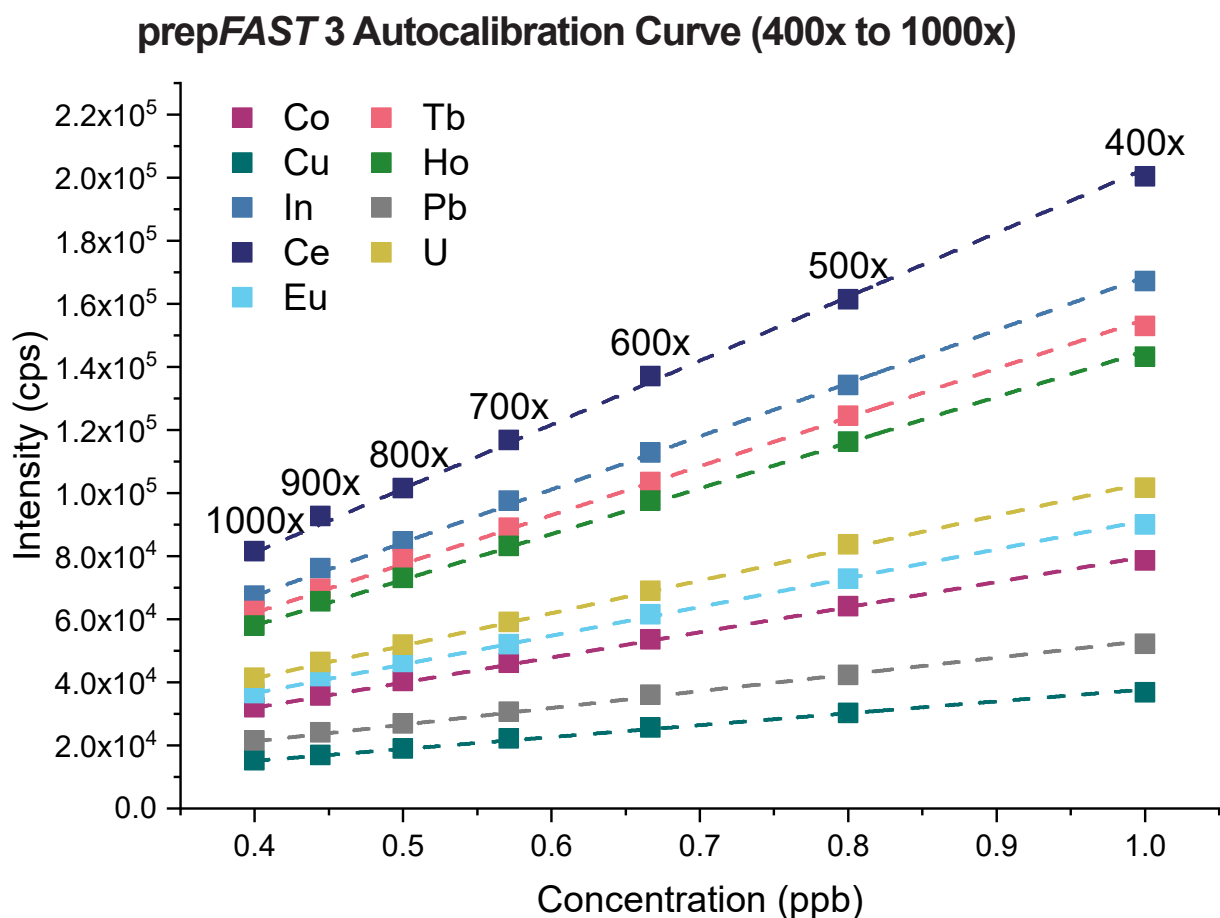
3
Inject & Analyze Diluted Sample



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prepFAST 3 fully automates precise dilutions up to 1000x, allowing nearly all samples to be automatically diluted within the calibration range. Samples requiring dilution are combined with diluent at exact ratios into a dilution loop, mixed with internal standard, and injected to the ICP. Undiluted samples are vacuum loaded into the sample loop, bypassing the dilution loop before analysis.

Extended Autodilution Range with prepFAST 3



Calibration was performed with a 400 ppb, nine element standard. Using the prepFAST 3, dilutions from 400x to 1000x were automatically prepared inline using the prepFAST 3 autodilution and analyzed by ICPMS. These results demonstrate excellent linearity and retention of dynamic range at dilution factors well beyond conventional single-stage inline automated sample preparation limits.

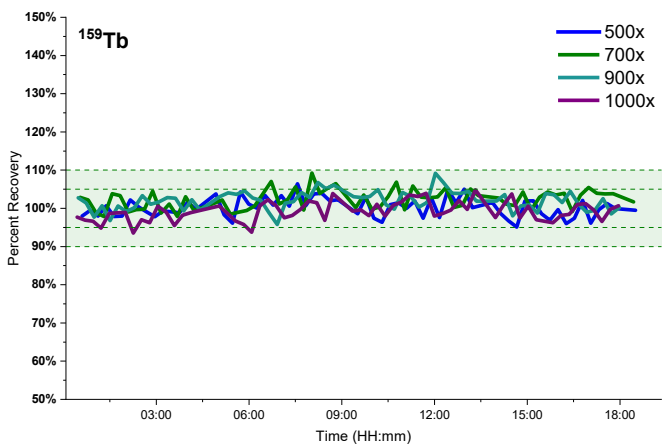
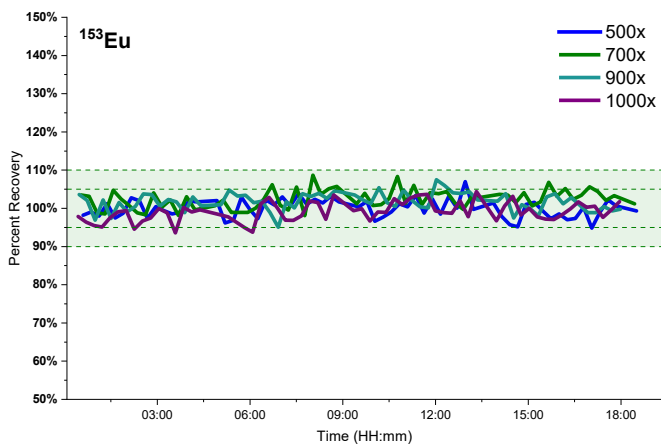
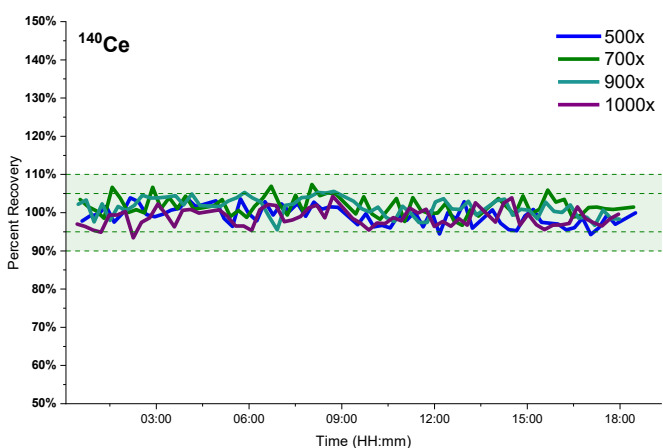
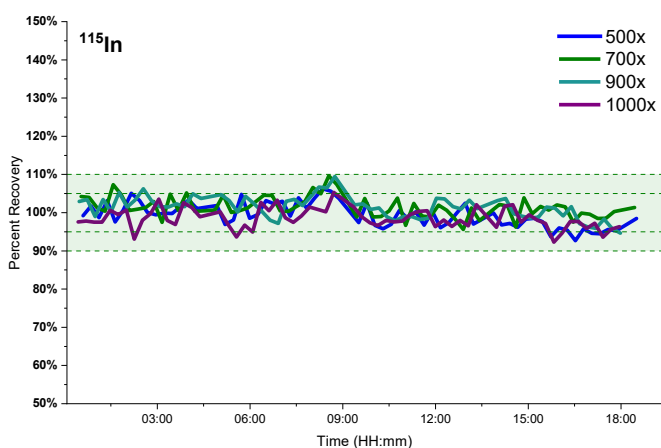
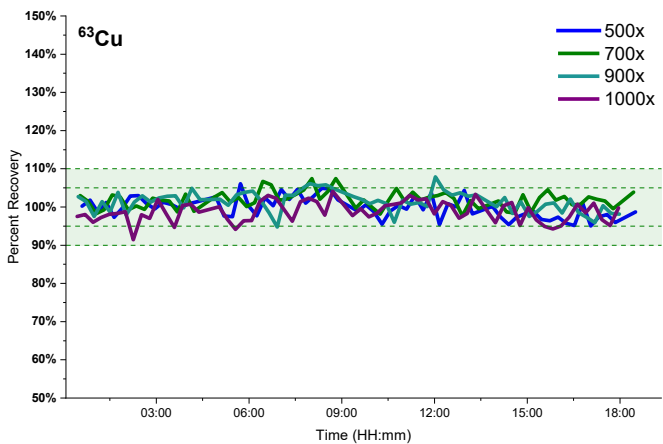
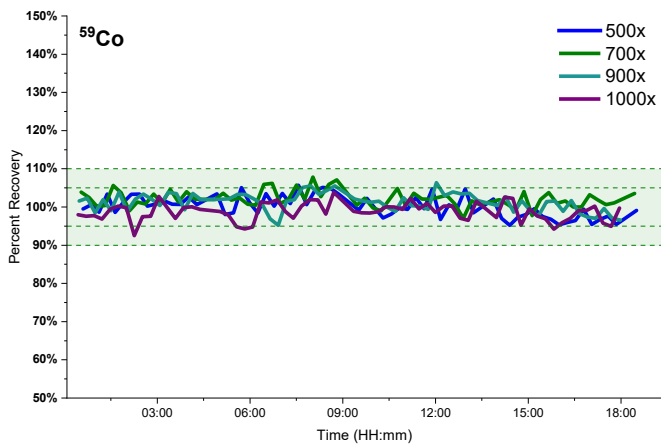
Calibration Performance at 400-1000x Dilution

Analyte	Monitored <i>m/z</i>	R ²
Co	59	0.9999
Cu	63	0.9997
In	115	0.9999
Ce	140	0.9999
Eu	153	0.9998
Tb	159	0.9999
Ho	165	0.9999
Pb	208	0.9998
U	238	0.9999

Regression results for nine analytes diluted 400-1000x with prepFAST 3. All achieved R² ≥ 0.9997, confirming excellent linearity and consistent accuracy across the entire dilution range.

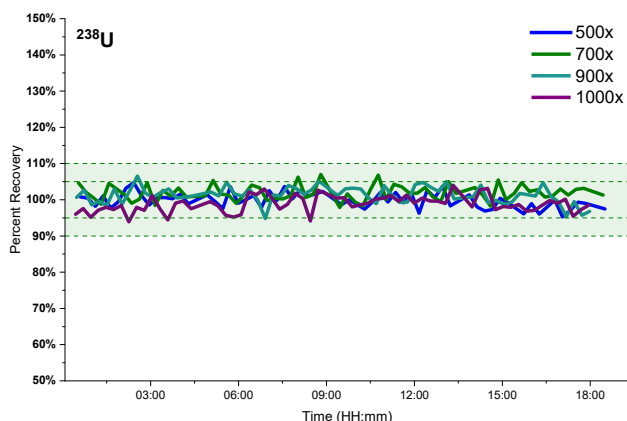
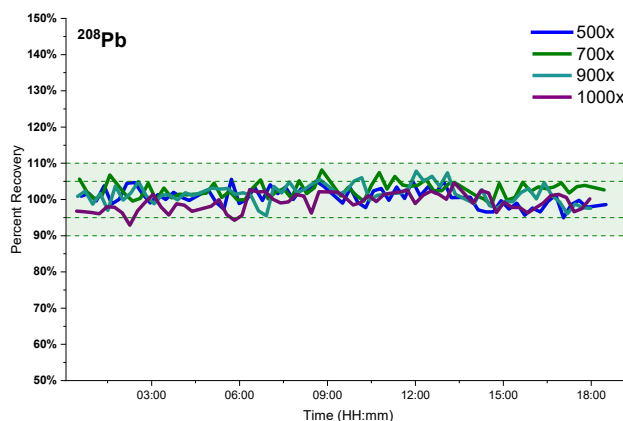
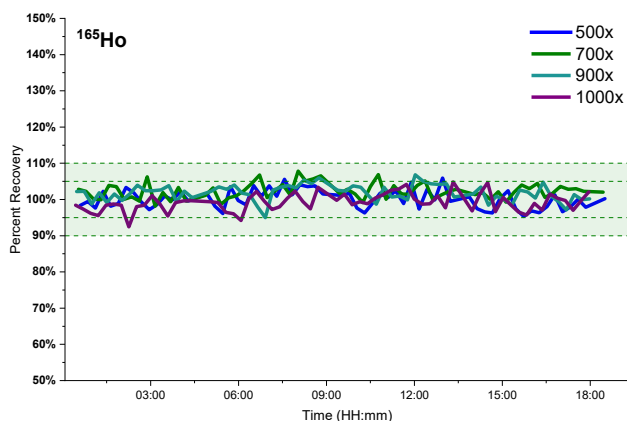
Extended Autodilution Range with prepFAST 3

Percent Recoveries at Dilution Factors of 500x, 700x, 900x, and 1000x



Extended Autodilution Range with prepFAST 3

Percent Recoveries at Dilution Factors of 500x, 700x, 900x, and 1000x



A 400 ppb multi-element solution containing Co, Cu, In, Ce, Eu, Tb, Ho, Pb, and U was automatically diluted by the prepFAST 3 at eight dilution factors and analyzed by ICPMS. Percent recoveries are shown for four of the eight dilution factors. For each dilution factor, 63 replicates were measured over 18 hours of continuous operation, totaling more than 500 dilutions. Across all elements and dilution factors up to 1000x, 94% of samples had recoveries within $\pm 5\%$ of expected values, with all samples recovering within $\pm 10\%$. These results confirm that even at elevated dilution factors, prepFAST 3 maintains accuracy and precision suitable for quantifying over-range samples without manual intervention.



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