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Brief

The prep*FAST* inline autodilution system autocalibrates and autodilutes 50% Aqua Regia samples for the precise and accurate determination of precious metals. Seamless integration of prep*FAST* with ICP software eliminates a hazardous manual dilution step that requires both time and additional reagents/tubes.

Features:

- Autocalibrate from a single stock standard

- Autodilute sample digests (50% acid)

- Automate hazardous labor intensive steps

- Fluoropolymer sample pathway

- High speed analysis (<1 min/sample)

- Reduce cost per analysis

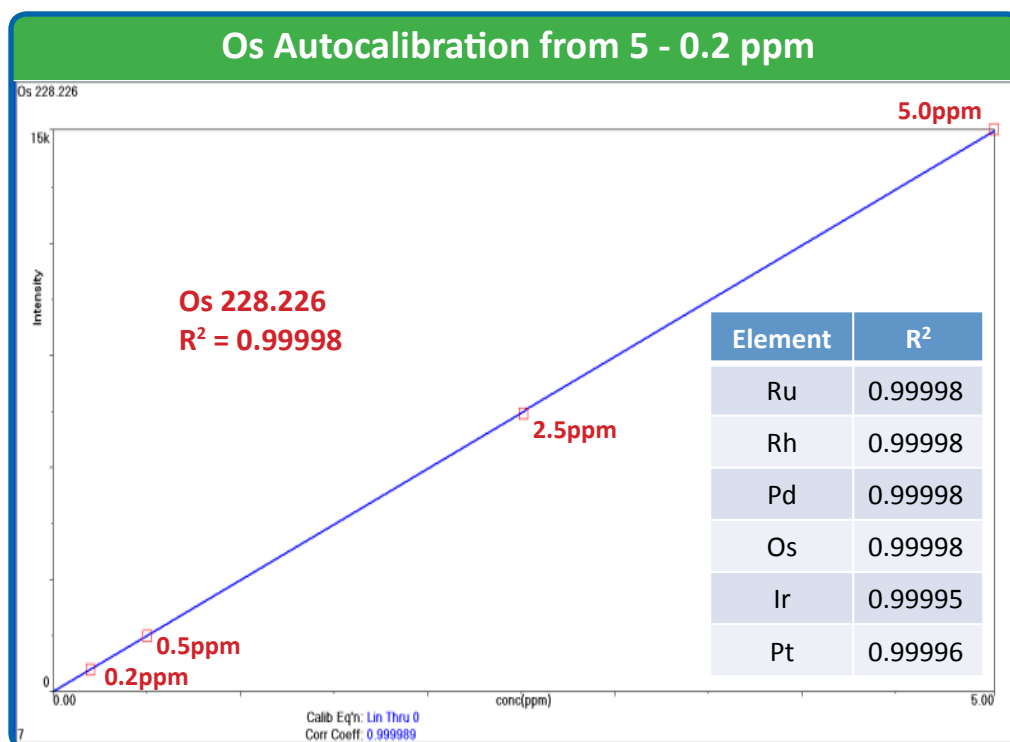- Routine walk up and analyze solution for ICP and ICPMS

Os Autocalibration from 5 - 0.2 ppm

Os 228.226
$R^2 = 0.99998$

Element	R^2
Ru	0.99998
Rh	0.99998
Pd	0.99998
Os	0.99998
Ir	0.99995
Pt	0.99996

Calib Eq'n: Lin Thru 0
Corr Coeff: 0.999989

Figure 1. prep*FAST* automatically generates a 0.2 (25x), 0.5 (10x), 2.5 (2x) and 5.0 (1x) calibration curve from a 5 ppm Au, Ir, Os, Pd, Pt, Rh, and Ru (5% HCl/5% HNO_3) stock standard solution. Precise and accurate syringe based inline autodilution is illustrated through excellent linearity of all calibration curves.

Abstract

Fire assay is one of the oldest known techniques for purifying precious metals. Typically Ni (Au, Ir, Os, Pd, Pt, Rh, and Ru) or Pb (Au, Pt and Pd) are used to scavenge precious metals from their matrix during fusion. The resultant sulfide bead and extracted precious metals are then digested in strong mineral acids (50% Aqua Regia). Using prep*FAST,* sample digests (50% Aqua Regia) can simply be placed on the autosampler rack with a blank and a 5 ppm multi-element (Au, Ir, Os, Pd, Pt, Rh, and Ru) stock standard. The prep*FAST* system will automatically generate a 0.2 (25x), 0.5 (10x), 2.5 (2x) and 5.0 (1x) calibration curve and analyze samples at a rate of nearly 90/hr.
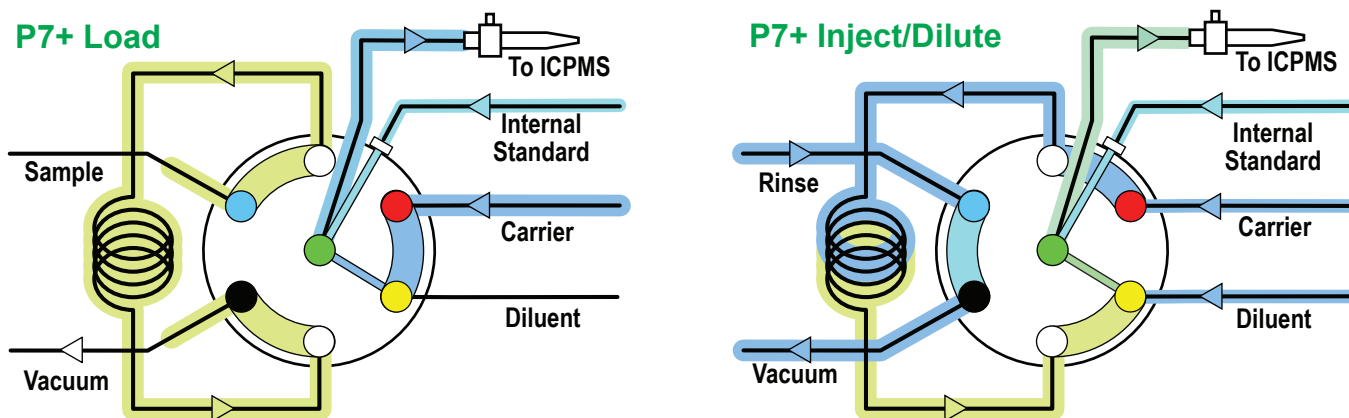
Figure 2. The prep*FAST* system schematic illustrating 1) sample loading during spray chamber rinse and 2) sample injection dilution and internal standardization.
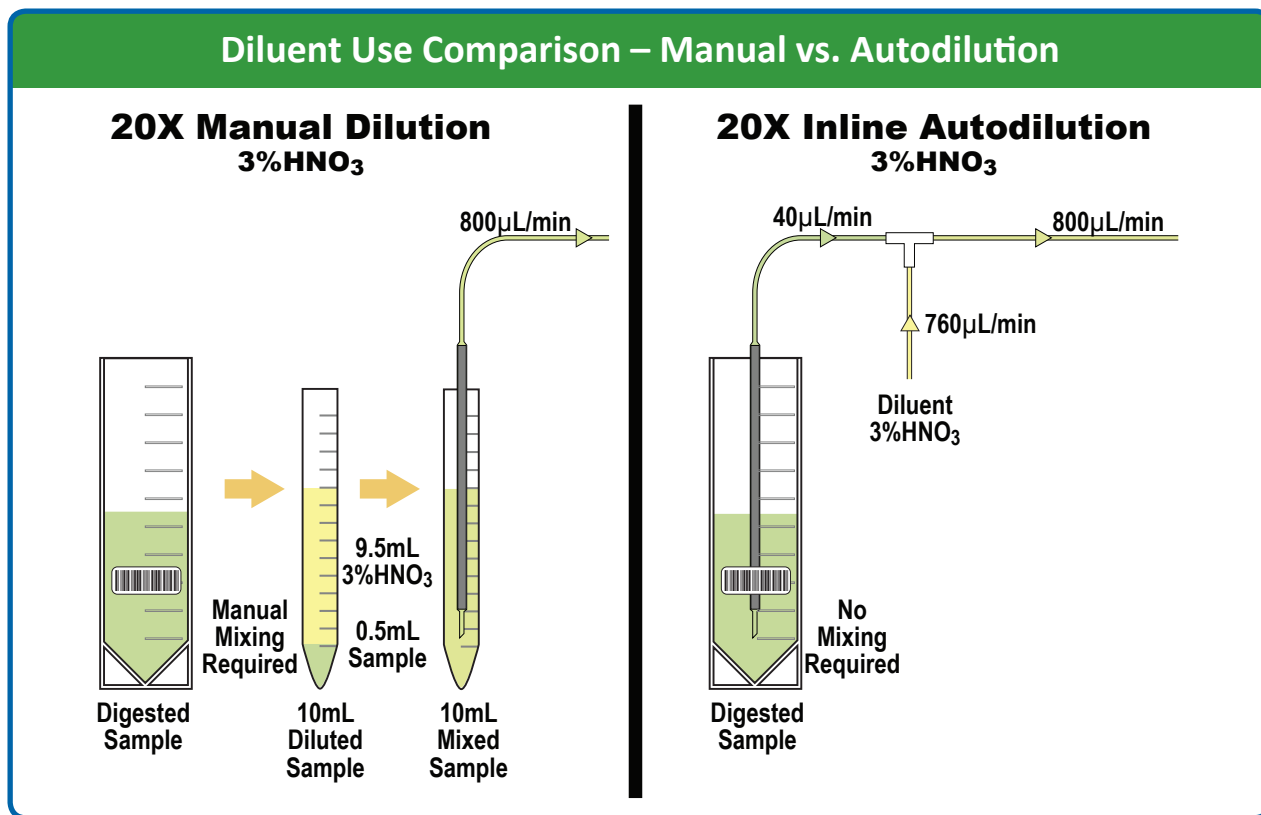

Figure 3. Typical 10 mL sample volumes at 20x dilution factor would require 9.5 mL of diluent. prep*FAST* saves reagent by only diluting the volume of sample being analyzed. In this experiment (20x dilution) prep*FAST* uses only 0.5 mL of diluent per sample. Depending on number of reagents, reagent concentration and purity this 19x reduction in diluent represents a significant savings.
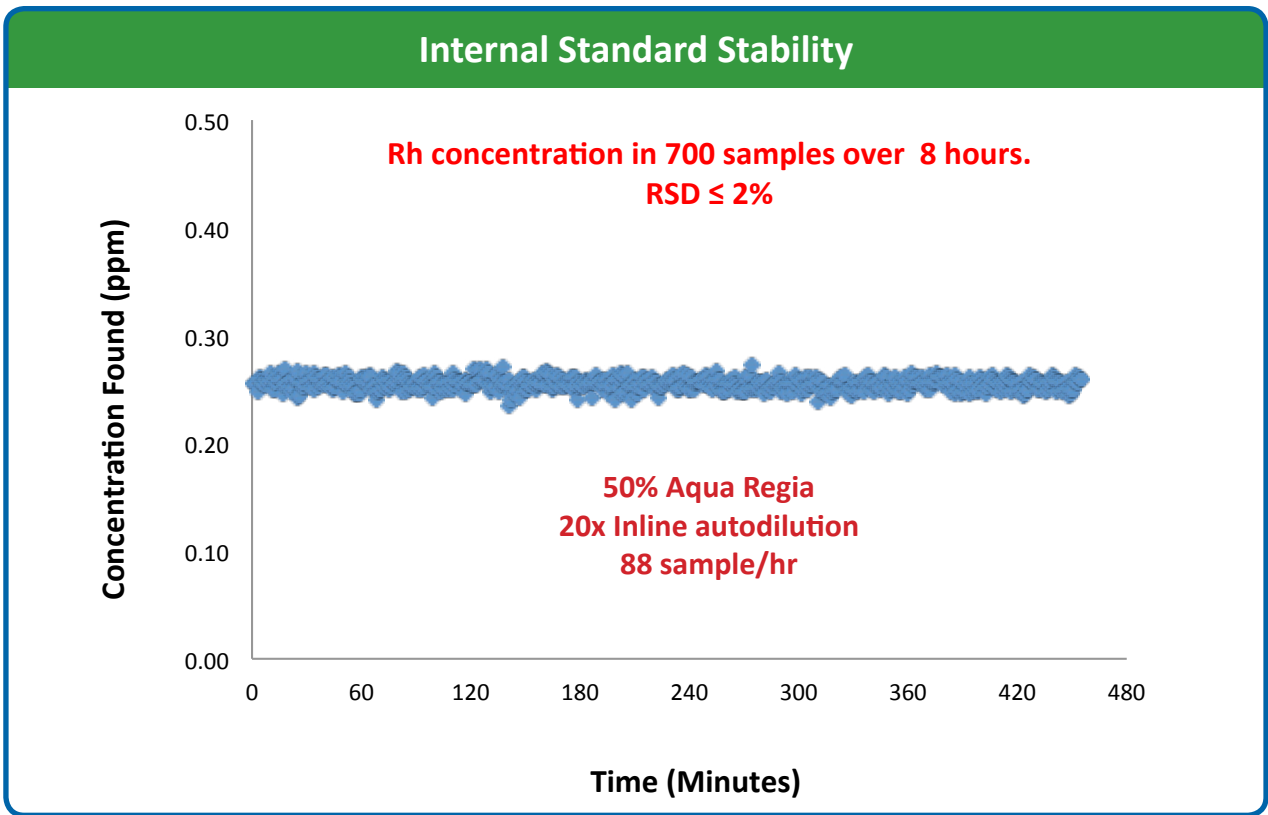
Figure 4. A 5ppm Au, Os, Ir, Pt, Pd, Rh, and Ru sample prepared in 50% Aqua Regia simulates a fire assay digestion. The concentrated mineral acid solution is diluted 20x inline for 700 replicate sample analysis of 0.25 ppm of precious metals. prep*FAST* inline autodilution illustrates not only a rapid throughput at 88 samples per hour, but also very accurate reproducible results for a 50% Aqua Regia matrix.
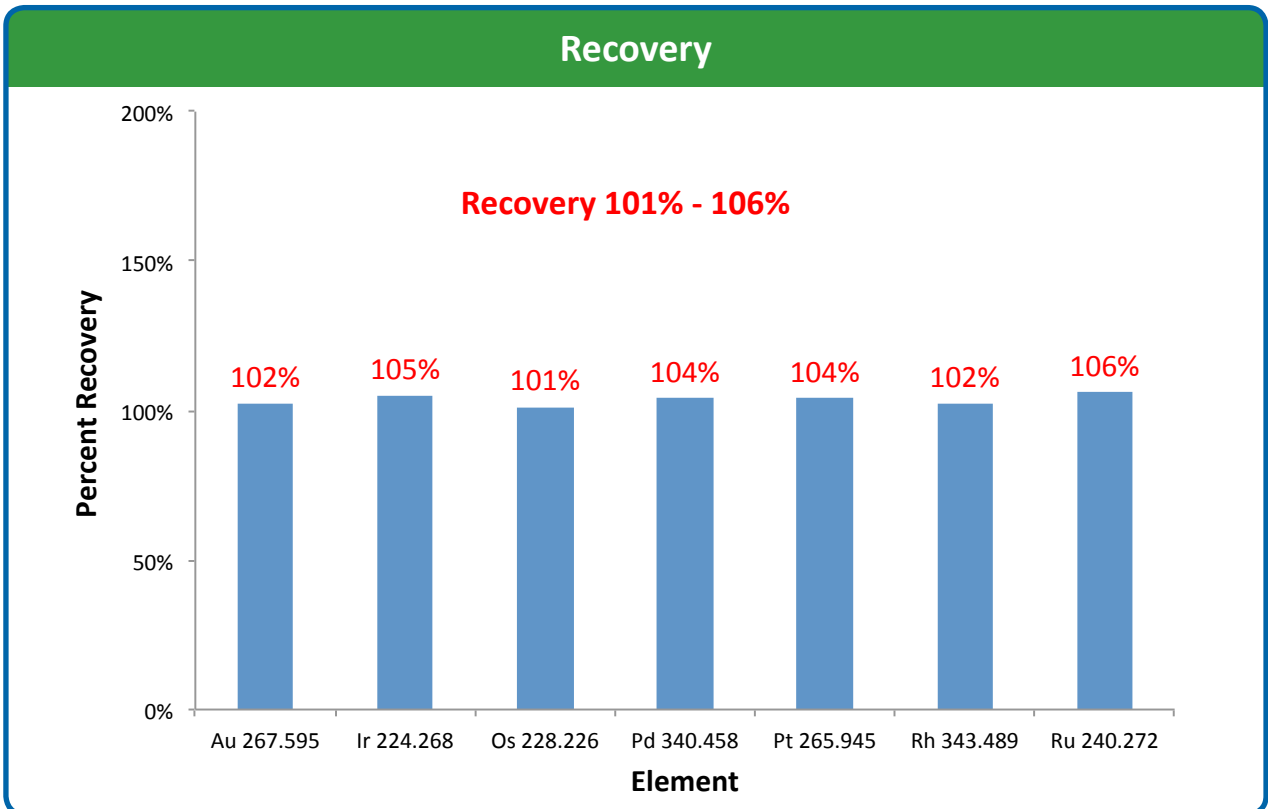

Figure 5. Recovery based on the 700 analysis of 0.25 ppm precious metal is both quantitative (101 to 106%) and precise (<3%).

Benefits:

- Reduce cost per analysis through inline sample dilution
  - ✓ Cut sample time in half
  - ✓ Reduce the amount of diluent (by 20x)
  - ✓ Reduce the number of vials (by half)
  - ✓ Eliminate hazardous (50% Aqua Regia) manual sample dilution step
  - ✓ Eliminate pump tubing, consumables, and maintenance
- Simply place rack with digested samples on the autosampler and run

SC-2 DX prep*FAST* System

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