



**Elemental Scientific**  
ICP | ICPMS | AA

# seaFAST Litre

**High-Volume Automated  
Seawater Analysis**



# seaFAST Litre™

## High-Volume, Ultrapure Preconcentration

The seaFAST Litre high-volume automated preconcentration system is designed to preconcentrate large volumes of seawater for ultratrace determination of elemental concentrations and isotope ratios. Bottles with high-volume samples up to 2 L each may be connected directly to the ultrapure valve system for contamination-free preconcentration and matrix removal. Smaller samples, standards, or blanks for routine analysis may be placed on the autosampler for direct sampling and preconcentration.

Automatic preconcentration and matrix removal enhances accuracy and precision, eliminates manual sample handling and the resulting contamination, and dramatically improves detection limits compared to direct analysis or manual sample preconcentration.



seaFAST Litre  
System

- New high-flow chelation column allows higher sample throughput
- Sample volumes from 10 mL to > 1 L may be preconcentrated
- Automated preconcentration factors > 1000 are possible
- Samples may be drawn from bottles or vials on the autosampler deck or from bottles connected directly to a stream selector valve
- Elute purified sample inline to an ICPMS or offline to a destination vial
- Enclosed, polypropylene cabinet with integrated ULPA filter maintains sample integrity
- Ultrapure DI water source connects directly to the system for the lowest blanks.
- Ultrapure, fluoropolymer flow path
- Eliminates contamination from manual sample handling



seaFAST Litre  
Column

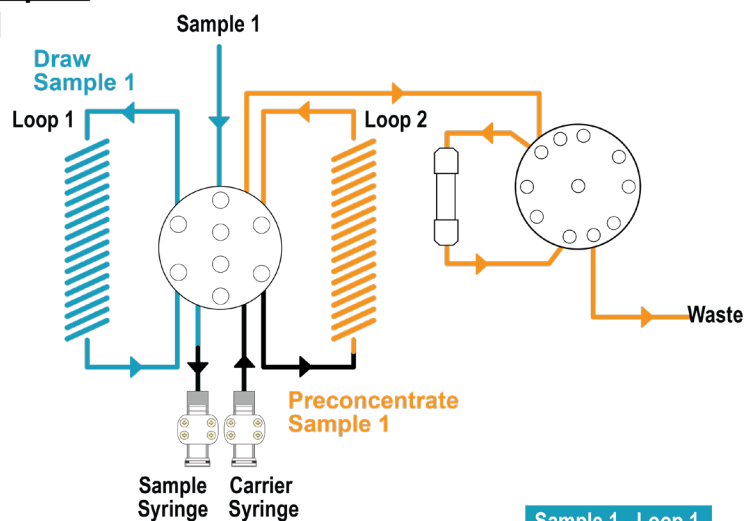
# Dual Loop Preconcentration

## Maximize Throughput and Minimize Sample Waste

- Load 10 mL sample onto the column from one loop while sample is drawn into a second 10 mL loop
- When sample loading onto the column is completed, switch loops and immediately load the second loop onto the column and draw additional sample into the first loop
- Repeat as desired to increase preconcentration factor.
- After preconcentration and matrix removal, the chelated analytes are eluted into a destination vial using an eluent solution.

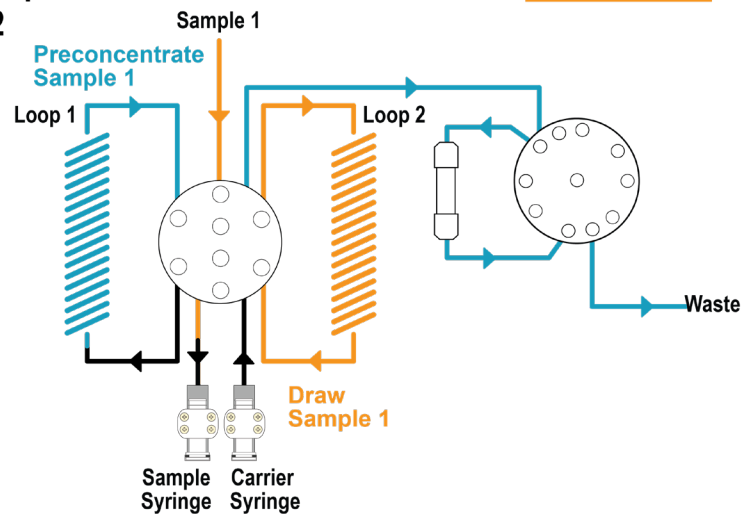
### Load Sample 1

#### - Cycle 1



### Load Sample 1

#### - Cycle 2



# Preconcentration and Matrix Removal

## Preconcentration and Matrix Removal

### Step 1

- Inline addition buffer to pH > 6
- Matrix to waste
- Transition metals and rare earth elements are chelated.

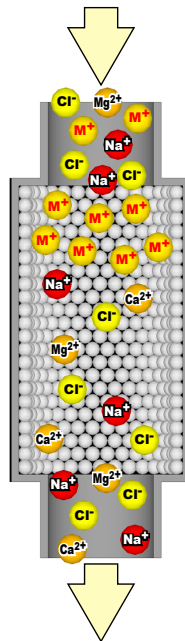
### Step 2

- $\text{H}_2\text{O}$  washes remaining matrix from column.

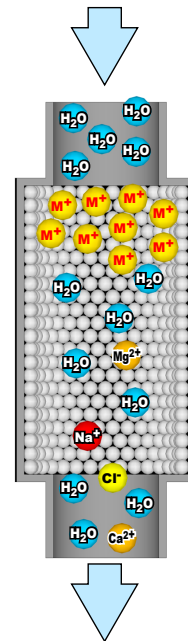
### Step 3

- Transition metals  $\text{M}^+$  are eluted into nebulizer with nitric acid  $\text{H}^+$   $\text{NO}_3^-$

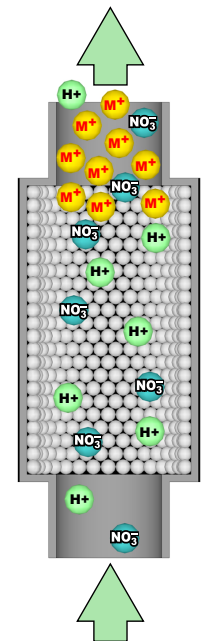
1) Loading (pH ~ 6)



2) Column rinse (pH ~ 6)



3) Elution (pH < 1)



1																	2		
H																	He		
3	4											5	6	7	8	9	10		
Li	Be											B	C	N	O	F	Ne		
11	12											13	14	15	16	17	18		
Na	Mg											Al	Si	P	S	Cl	Ar		
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36		
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr		
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54		
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe		
55	56			72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	
Cs	Ba			Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
87	88																		
Fr	Ra																		
		57	58	59	60	61	62	63	64	65	66	67	68	69	70	71			
		Lanthanides	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu		
		Actinides	89	90	91	92													
		Actinides	Ac	Th	Pa	U													

- Preconcentration or Direct Mode
- Direct mode
- Hydride or Direct Mode (S3/SP3 only)

# High-Efficiency Preconcentration

Performance is shown for various preconcentration factors of a 100 ppt multielement standard prepared in synthetic seawater. Recoveries and reproducibility with the new high-flow seaFAST column are suitable for both for large- or small-volume preconcentration applications.

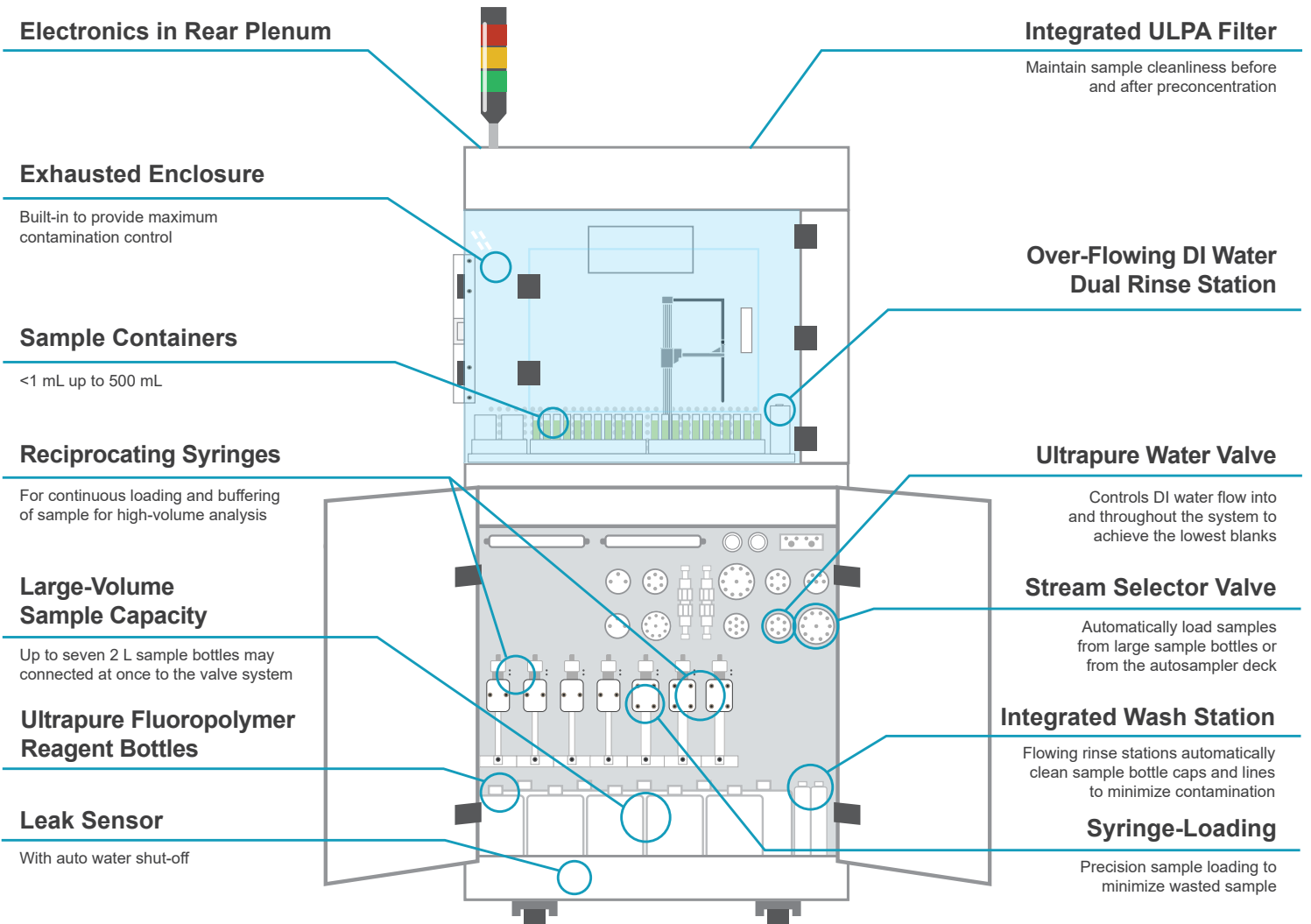
Preconcentration Factor	Average % Recovery (100 ppt, all REEs, Cd, Pb)
20x	107.1
100x	100.2
1000x	100.3

**% Recovery vs. Preconcentration Factor**



# Ultrapure Automation

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[www.icpms.com](http://www.icpms.com)

© Elemental Scientific | 7277 World Communications Drive | Omaha, NE 68122  
Tel: 1-402-991-7800 | [sales@icpms.com](mailto:sales@icpms.com) | [www.icpms.com](http://www.icpms.com)