GETTING THE MOST OUT OF YOUR ICP IN THE GEOCHEMICAL LAB
CHALLENGES IN THE GEOLOGY LAB

- Sample Prep
  - Homogeneity
  - Grinding
  - HF
  - MicroWave

- Analysis
  - HF
  - High TDS
  - Carryover
SUITABLE NEBULIZERS

- OpalMist
  - HF
  - high TDS
  - high purity

- DuraMist
  - HF
  - high TDS

- Ceramic VeeSpray
  - HF
  - particulates
  - high TDS

- SeaSpray
  - high TDS

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DURAMIST NEBULIZER

Ideal for HF and High TDS Samples

- PEEK body and PFA capillary.
- Particulates up to 75um.
- Tolerance to harsh chemicals, up to 5% HF.
- TDS tolerance, typically ~ 30%.
- 0.4 and 1.0 mL/min uptake models.
- Designed for 40psi, either 1.0 or 0.7 L/min argon flow.

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COMPARISON OF SENSITIVITY

As_188  Zn_206  Ni_231  Ba_233  Mn_257  Cr_267  Mg_280  Mg_285  Cr_357  Ba_455

OpalMist  PolyCon  DuraMist

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DURAMIST LONG-TERM STABILITY

Time (minutes)

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Tolerance to Dissolved Salts (20%)

- Natural aspiration of 20% NaCl.
- Nebulizer gas flow monitored at constant pressure.
- Total time of 20 minutes.
INERT SPRAY CHAMBERS

- ICP-OES
  - PTFE Material
    - Inert
    - High purity
    - Stediflow surface treatment
  - 50mL internal volume

- ICP-MS
  - PFA Material
    - Inert
    - Ultra high purity
    - Stediflow surface treatment
  - 44mL internal volume

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INERT SPRAY CHAMBERS - SENSITIVITY

Sensitivity of inert spray chambers relative to glass spray chamber (relative sensitivity = 1)

Polypropylene

Teflon

Relative Sensitivity

E (eV)

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EFFECT OF CHALLENGING MATRICES ON TORCHES

Challenging Matrices

VISIT BOOTH # 2727
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Demountable outer tube.
Demountable injector.
Optional ceramic outer tube.
Economical price.
TORCH COMPARISON: CASE 1

6 HOURS OF RUNNING 10% NaCl

Quartz outer tube

Ceramic outer tube
Lithium Metaborate fusions

TORCH COMPARISON: CASE 2

3 years at 5 - 7 days per week (20 - 22 hours per day)

- Brand new ceramic outer tube

- Standard quartz torch was lasting approximately 100 hours.
- Ceramic torch has replaced 200 standard quartz torch.
- Saving approximately $40,000.00 USD in consumable costs.

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<table>
<thead>
<tr>
<th>Element (λ)</th>
<th>Detection Limit (µg/L)</th>
<th>Radial Quartz Torch</th>
<th>Radial Ceramic D-Torch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al 167</td>
<td>1.6</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Ba 455</td>
<td>0.07</td>
<td>0.12</td>
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</tr>
<tr>
<td>Cu 324</td>
<td>0.88</td>
<td>0.62</td>
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<tr>
<td>K 766</td>
<td>25.5</td>
<td>11.7</td>
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<tr>
<td>Mg 279</td>
<td>0.05</td>
<td>0.05</td>
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<tr>
<td>Mn 257</td>
<td>0.36</td>
<td>0.25</td>
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<tr>
<td>Ni 221</td>
<td>1.6</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>P 177</td>
<td>5.1</td>
<td>5.0</td>
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<tr>
<td>Zn 213</td>
<td>0.23</td>
<td>0.28</td>
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</tr>
</tbody>
</table>
STABILITY USING CERAMIC D-TORCH

(3% NaCl solution)

Concentration (mg/L)

Time (hrs)

Al 167  Ba 455  Cu 324  Mg 279
Mn 257  Ni 221  P 177  Zn 213

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MINIMIZING CARRYOVER

- Niagara CM
  - Reduces exposure to sample on back end
  - Starts rinsing earlier
- Niagara Plus CM
  - Reduces exposure to sample on back end
  - Reduces exposure to sample on front end
  - Starts rinsing earlier
  - Sample does not contact pump tubing

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SUMMARY

- DuraMist nebulizer
- Inert spray chamber with Stediflow
- D-Torch with ceramic outer tube
- Niagara accessory for fast washout