



Elemental Scientific, Inc.
Technical Note-1

Sensitivity Increase
APEX E & ICP-OES

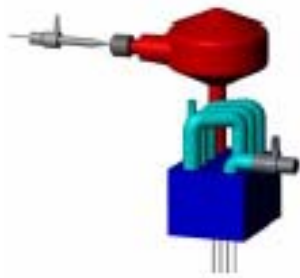
A number of applications require detection limits below that of many ICP-OES instruments. Conditioning the aerosol and improving sample transport efficiencies using the APEX E (700 µL/min) increases sensitivity by more than 8 fold. The enhanced sensitivity results in an across the board 5 to 7 fold improvement in detection limits for most elements.

Instrumentation & Sample Intro

- Varian MPX radial view
- Meinhard concentric nebulizer
- Glass cyclonic spray chamber
- APEX E
- 700 µL min⁻¹ PFA-ST nebulizer

APEX E

The Apex is a fully-integrated inlet system that connects directly to the torch injector and incorporates ESI's MicroFlow PFA or PP nebulizer technology. Liquid samples are nebulized into a heated cyclonic spray chamber



and Peltier cooled desolvation system where the sample aerosol is conditioned to produce uniform aerosol that is transported to the ICP.

Sensitivity

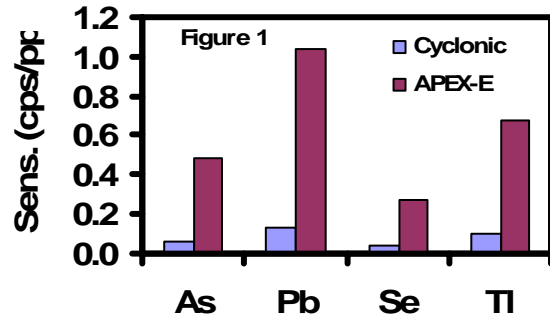
With the recent and continual improvements in reagents, sample preparation equipment, operating environment (HEPA hoods) and sample introduction associated blanks, OES detection power is rarely limited by blank level. Spectral noise, therefore plays an important role in defining detection limits, as a result improvements in sensitivity often directly correlate to improvements in detection limit. The APEX E sample introduction system

Data Courtesy of:

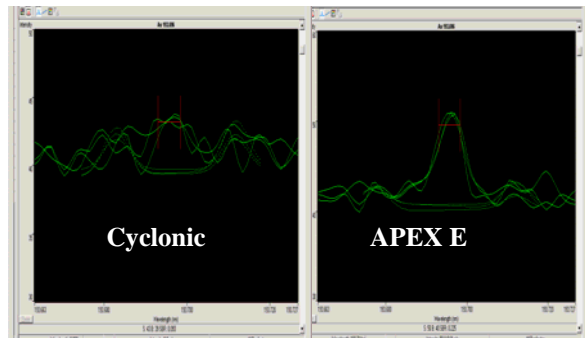
M. Paul Field, Institute of Marine and Coastal Sciences, Rutgers The State University of New Jersey



increases sensitivity by more than 8 times at flow rates similar to or lower than more



standard meinhard-cyclonic sample introduction systems (Figure 1). This improvement in sensitivity is illustrated for As below in Figure 2. Using standard cyclonic sample introduction system a 10 ppb As solution does not produce a peak that is discernable from the spectral noise.



When using the APEX E, however, the same 10 ppb solution generates in a very reproducible detectable peak. This 8 fold enhancement in sensitivity, at similar to lower sample consumption rates, results in up to a 7 fold improvement in detection limits (Figure 3). For the Varian radial view instrument this provides single digit ppb detection limits for analytes with poor sensitivity such as As, Pb, Se and Tl.

