

# High Volume Sample Analysis with the Iris Intrepid II and the EXR-8 Extended Autosampler.

## Key Words

- ICP-OES
- Automated analysis
- High throughput sampling

## Introduction

To survive in today's competitive market, commercial and routine laboratories must achieve higher productivity with a smaller workforce and lower profit margins. Higher productivity means higher sample throughput and effective use of all available time without increasing labour costs by introducing costly and unpopular weekend work schedules. The EXR-8 Autosampler coupled to an ICP spectrometer will increase productivity by sampling for longer periods without operator intervention.

## EXR-8 Autosampler

The new EXR-8 Autosampler from CETAC is an innovative design consisting of a moveable autosampler with a specialised rail and drive system coupled with a fixed tray. The autosampler samples the first set of racks then "drives" along the rail system to an end stop to sample the second set of racks. A maximum of eight racks can be accommodated in the sample tray with any combination of rack sizes 21, 24, 40, 60, and 90 positions available. Using the largest racks available with 90 positions equates to a full tray of a massive 720 samples.

## Experimental

To demonstrate the increased productivity, a sample containing a variety of elements was analysed repeatedly using the new EXR-8 Autosampler coupled to an ICP Spectrometer. The time scale for the analysis was then used to determine the maximum unattended time available when analysing a full load of samples. Subsequent calculations will show the advantages of the EXR-8 and Intrepid II have for productivity.

## Instrumental

The EXR-8 was connected to the PC of an Intrepid II via an RS232 cable and controlled using the TEVA software. The Intrepid II XDL Radial was utilised to give the average time for analysis with the EXR-8. Default instrument parameters suitable for a general analysis were used and are listed below along with EXR-8 set up information.

### ICP Parameters:

- Power: 1150W
- Nebuliser Gas Flow: 0.65 L/min
- Auxiliary Gas Flow: 0.5 L/min
- Integration Times: 30 seconds UV slit, 5 seconds Vis slit – 3 integrations/sample
- Flush Times: 45 seconds preflush, 25 seconds "step-ahead", 15 seconds rinse.

### EXR-8 Extended Autosampler:

- Rack type: 90 position sample rack (6x15 standard CETAC rack) – 8 racks
- Standards: Blank, High Standard
- QC: Every 10 samples

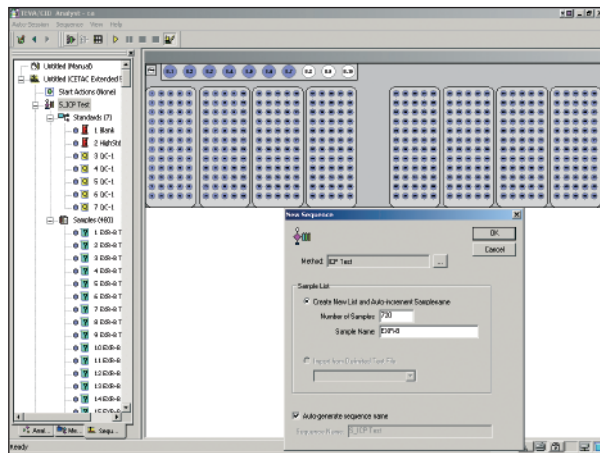


Figure 2: Screenshot of autosampler setup

## Results

The results pages are shown below and are representative of the 720 samples.

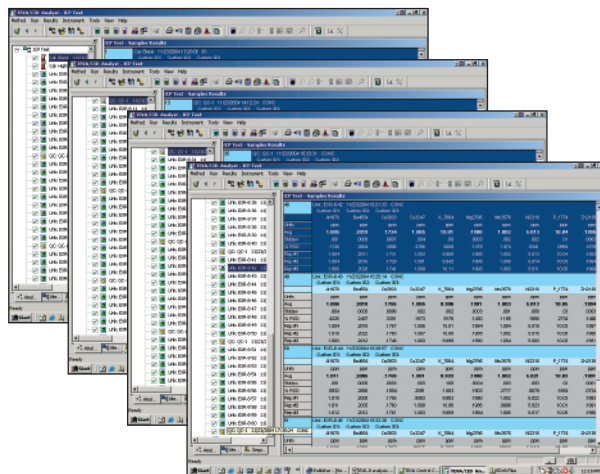


Figure 3: Screenshots of Result Sheets

Plots of the number of samples analysed per unit time and the calculations for the relative efficiencies of the EXR-8 versus a smaller 360-sample autosampler are shown below.

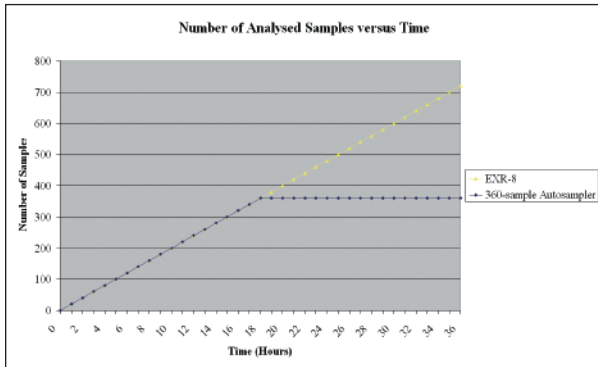


Figure 4: Number of Unattended Samples analysed vs. Time

### EXR-8 Efficiency Calculations:

#### Parameters:

- Weekend unattended operations only
- QC checks every 10 samples
- EXR-8 sample load of 720 samples
- Smaller autosampler with a load of 360 samples

Weekend hours available = 48

Average analysis time including flush and rinse = 3 minutes

Smaller Autosampler = 360 samples

Total time for run =  $(360 \times 3) / 60 = 18$  hours

Idle instrument time =  $48 - 18 = 30$  hours

EXR-8 autosampler = 720 samples

Total time for run = 36 hours

Idle instrument time =  $48 - 36 = 12$  hours

Additional analysis time generated =  $30 - 12 = 18$  hours  
per weekend

Additional samples analysed per year =  $360 \times 52 = 18720$  samples

### Conclusions:

The calculation of additional yearly samples possible with the EXR-8 shows the potential of the EXR-8 for high sample throughput. The results in the above tables and graphs show that Thermo Electron Corporation ICPs coupled with an EXR-8 autosampler make highly efficient and effective use of available analysis time.

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