Gas Consumption of the TSHR Trace Elemental Analyzers

A comparative study for the TS and TN 7000 Series.

When a Lab Manager is faced with the task of selecting the best instrument in the market to get the job done, he obviously considers technical specifications in first place. How sensitive, stable and repetitive the analyzer is, are very important factors to help in the decision making process. Then the study goes on to consider what's response of the detector, and what is the linearity? How large is the dynamic range? How flexible is the system? Finally, he considers other parameters like footprint, since the lab square footage is perhaps the most valuable asset a typical analytical lab possesses. Finally, he considers cost of the unit before making the final decision.

There is however an important factor that not all consider, and that is the cost of ownership. We all know how expensive specialty gases are and how scarce they become, especially noble gases that are often used in analytical chemistry as a mean to introduce the samples into the analyzers.

In this competitive note we undertake a simple but important exercise to show how the right instrument can help optimize lab operations in a cost effective manner. We focus our example in a vertical configuration S only or simultaneous S and N analyzer, model TN/TS 7000 that totally conforms to ASTM D5453 and D4629 respectively and illustrated in Fig.1, but is similar applicable to the horizontal 6000 model configurations for TN and TS analysis.

The calculations are based on a 300 scfm, 2500 psig cylinders for both Ar and O_2.

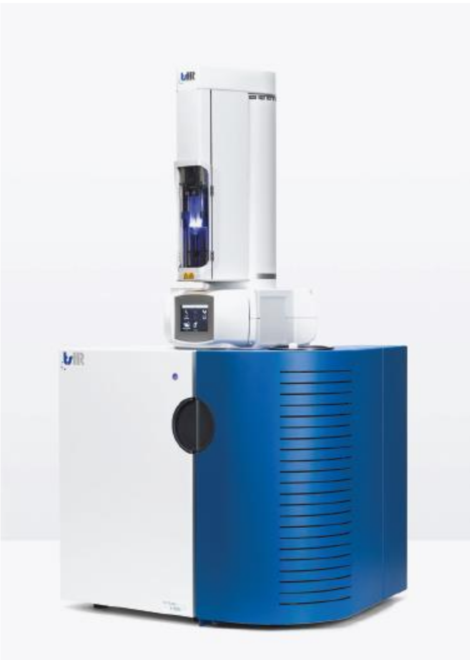

Figure 1. TSHR Elemental Analyzer vertical configuration, model TN/TS 7000

Below Table 1 calculates the total available time according to the final supply flows and delivery pressures. The total O_2 volume TSHR requires is 400 mL/min so it can work for 1.36 months in a single cylinder. The similar competitor instrument models that normally require 585 mL/min would go for less than a month.

	TSHR	Competition
Total O_2 flow (ml/min)	400	585
Total time (min)	7830	5350
Total time (hours)	130,5	89,2
Working shift (hours)	8	8
Total days 24/7	5	3,7
Total working days	41	28

Table 1. Oxygen gasflow comparison

The Argon consumption is also considerable; Table 2 shows savings in Ar of more than 50% total.

	TSHR	Competition
Total O_2 flow (ml/min)	75	150
Total time (min)	41667	5350
Total time (hours)	694	89,2
Working shift (hours)	8	8
Total days 24/7	28,9	14,5
Total working days	87	43

Table 2. Argon carrier gasflow comparison

Even pushing the carrier flow to 100mL/min the savings continue to be significant as 22 days in 24/7 environment and 65 days in 8 hours/day operation.

In stand by conditions it evidences important savings with the TSHR unit that automatically goes to stand by after the last sample is complete. Savings are 9:1 for the TSHR unit in standby. So the total savings can be as high as 10K$ for the period. It is important to note that TSHR units do not introduce oxygen together with the carrier in the inlet system. In the inlet the sample is vaporized without combustion and introduced into the combustion area in a more homogeneous form to allow for a smooth and complete combustion of the sample.