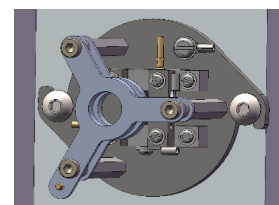
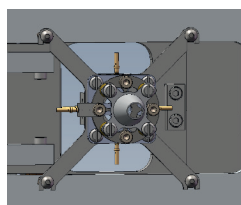


Nuclearised Versions of Attom ES



The nuclear torchbox has been designed to provide the easiest access to the sample handling and mass spectrometer interface parts when using gloves. For example, the extraction lens stack is accessible without breaking the vacuum into the main mass spectrometer and the assembly has a slotted mounting plate and push fit electrical connections for easy removal without having to handle small screws. Similarly, the high voltage focus lens immediately after the line of sight valve has a bayonet twist mount to make removal very easy with gloves. The glovebox even has USB ports to allow a web-cam to be used to more easily view areas behind the interface when necessary.

- **Same mass spectrometer**
- **Easy access torchbox**
- **Easy access ion optics**
- **Modified bench to take**
 - o Nuclear ready fume hood
 - o Nuclear ready glovebox
 - o User designed enclosure

Introduction

The Attom ES has well established performance and a track record of robust reliability for trace element and isotope ratio analysis used in a wide range of applications including nuclear applications.

In order to provide a safer working environment once the radioactivity in the samples exceeds a certain point, the Attom ES is available in a version compatible with fume hoods and gloveboxes. The design maintains the performance whilst the sample introduction, plasma and mass spectrometer interface remain within industry standard safety enclosures.

Design

The bench layout relocates the main power supplies, gas panel and plasma RF generator and provides a convenient platform to securely mount either a fume hood or glovebox. When ordered with the instrument, the fume hood and glovebox both provide industry approved levels of safety with seals and filters commonly used in nuclear enclosure designs (ISO 10648-2, Class 1). The fume hood has a by-pass design so constant air-flow is maintained as the front sash is raised and the glovebox version has a bagging port large enough to pass an autosampler or desolating nebuliser. Drawings can be provided should a locally manufactured enclosure be required instead.



Performance

The high performance of Attom ES is maintained in the nuclearised version so it is possible to obtain excellent isotopes ratios as well as accurate and precise trace element analysis, even in the presence of significant matrix.

Table showing isotope ratio performance for NBS reference materials U030 and U050 analysed multiple times in a mixed batch over 7 hours with 30 samples of each type. The drift over the seven hour run was calculated as the mean of the first three samples compared to the mean of the last three samples of the same type.

	Reference value	Mean over 7 hours	STDEV	%RSD	% Drift (7 hours)	Difference from reference
SRM U030						
234/Tot U	0.00019	0.000188	2.64E-06	1.40%	0.40%	-0.83%
235/Tot U	0.03046	0.03044	3.18E-05	0.10%	-0.04%	-0.07%
236/Tot U	0.000204	0.000202	2.08E-06	1.03%	0.55%	-0.97%
238/Tot U	0.96915	0.969718	3.19E-05	0.00%	0.00%	0.06%
SRM U050						
234/Tot U	0.000279	0.000277	2.19E-06	0.79%	0.42%	-0.58%
235/Tot U	0.0501	0.050084	3.7E-05	0.07%	-0.03%	-0.03%
236/Tot U	0.00048	0.000476	2.77E-06	0.58%	-0.66%	-0.77%
238/Tot U	0.94915	0.95007	3.64E-05	0.00%	0.00%	0.10%

Overlay chart showing uranium solutions of 0 to 200 mg/L with 50 ng/L of a ^{237}Np added. The Nu Quant baseline subtraction technique provides reported concentrations for each spiked solution to within $\pm 2\%$ of the added value (see Application Note NA15 for more detail).

