

The Elimination of Ar and other unwanted ions utilizing the new GBC patented “Smart Gate” Ion Blanking System.

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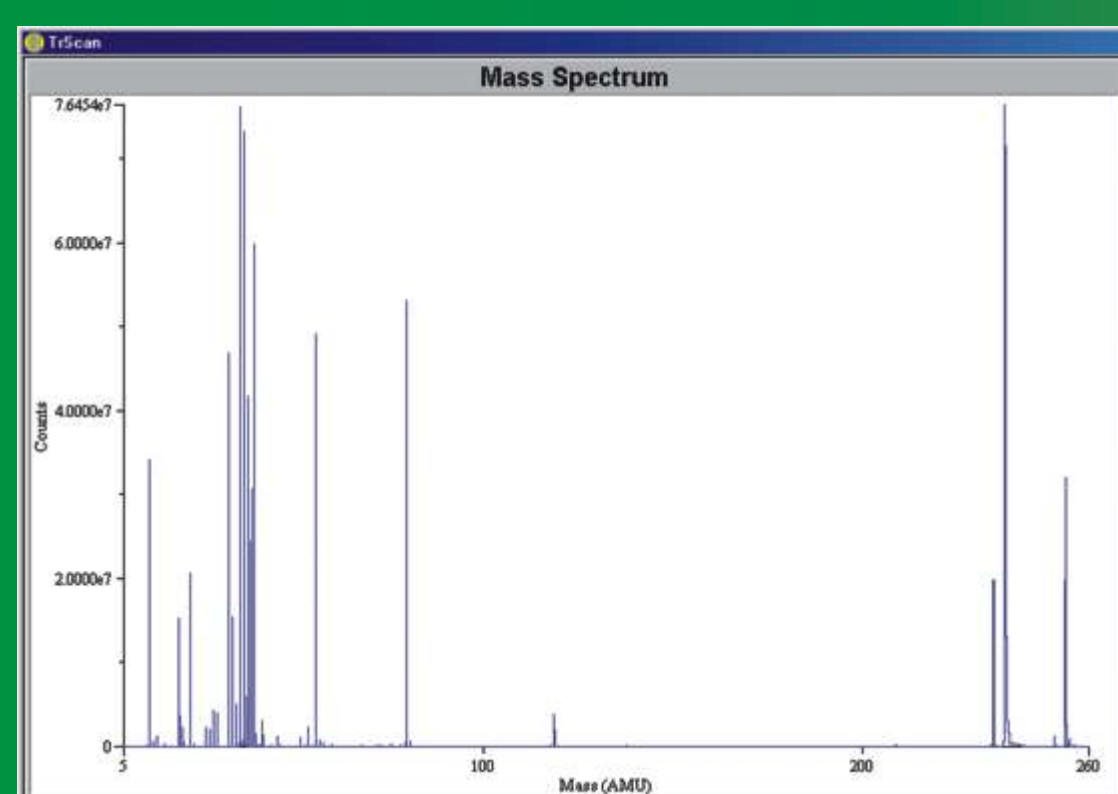


Fig 1. Optimass 8000 with 10 sec data acquisition and Blunker OFF for urine sample 1.

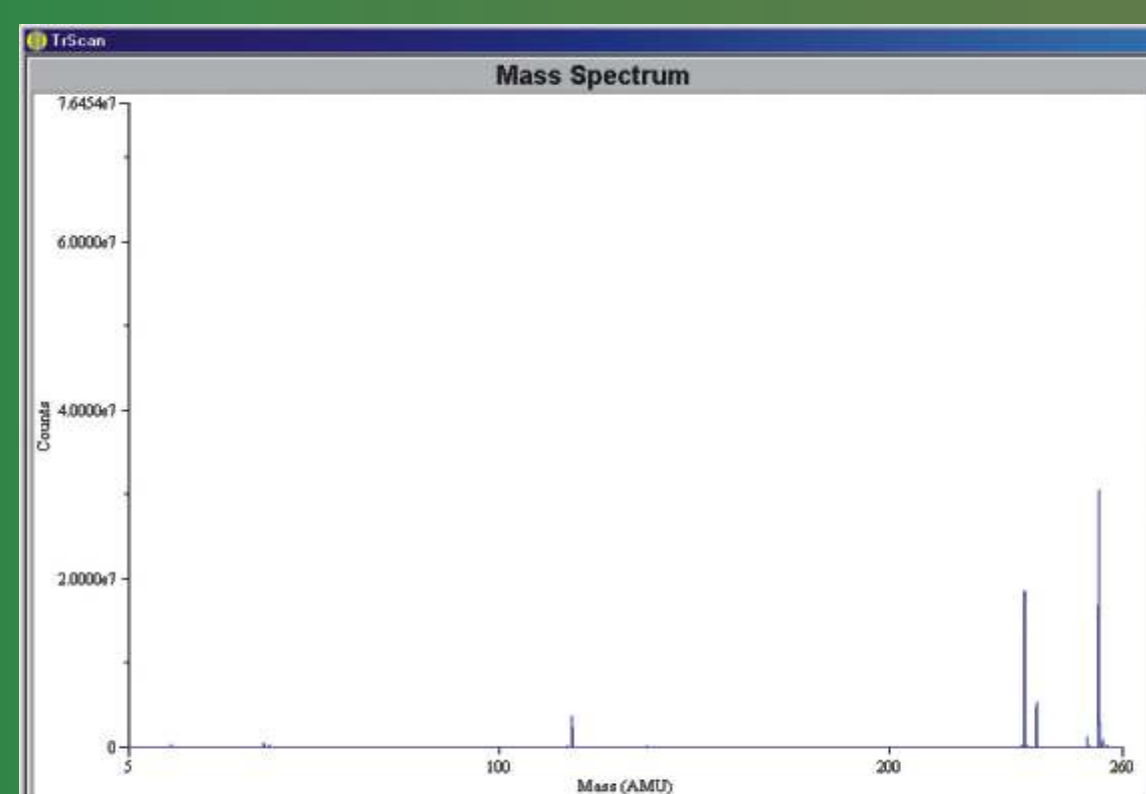


Fig 3. Optimass 8000 with 10 sec data acquisition and Blunker ON for urine sample 1.

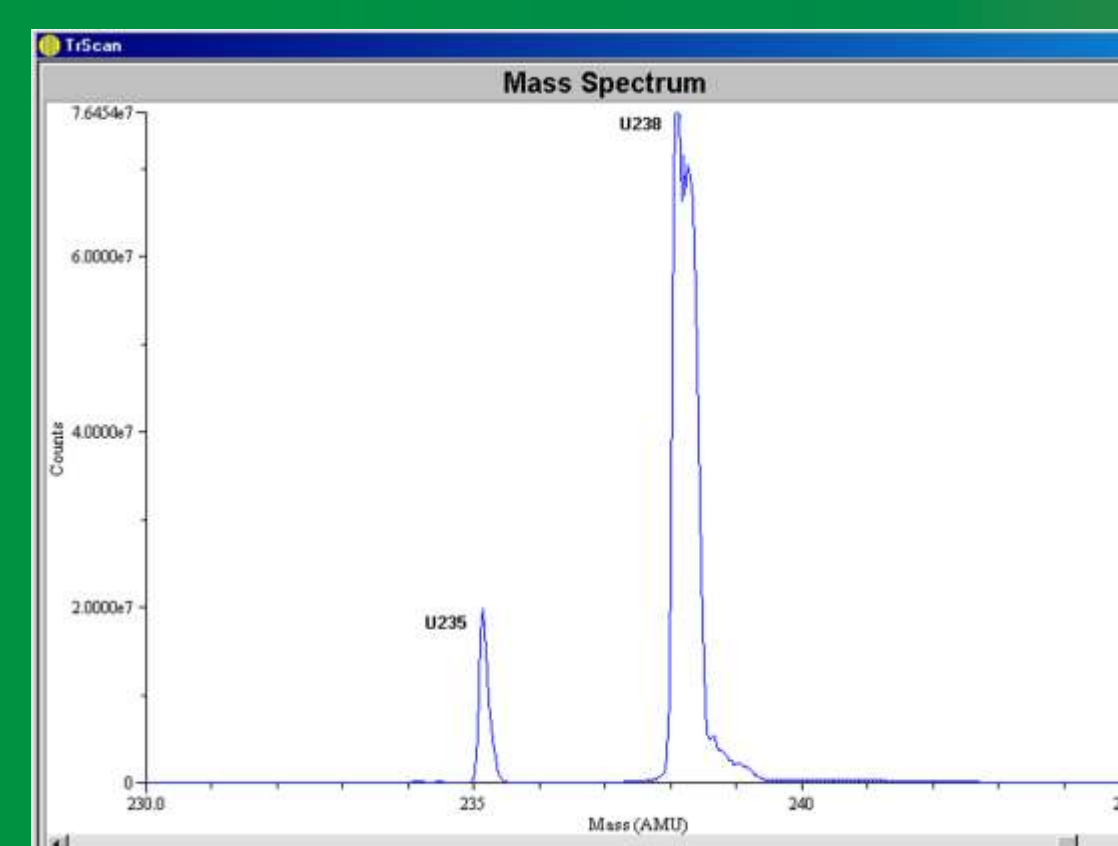


Fig 2. Zoom in from Fig 1 at AMU 230 to 245.

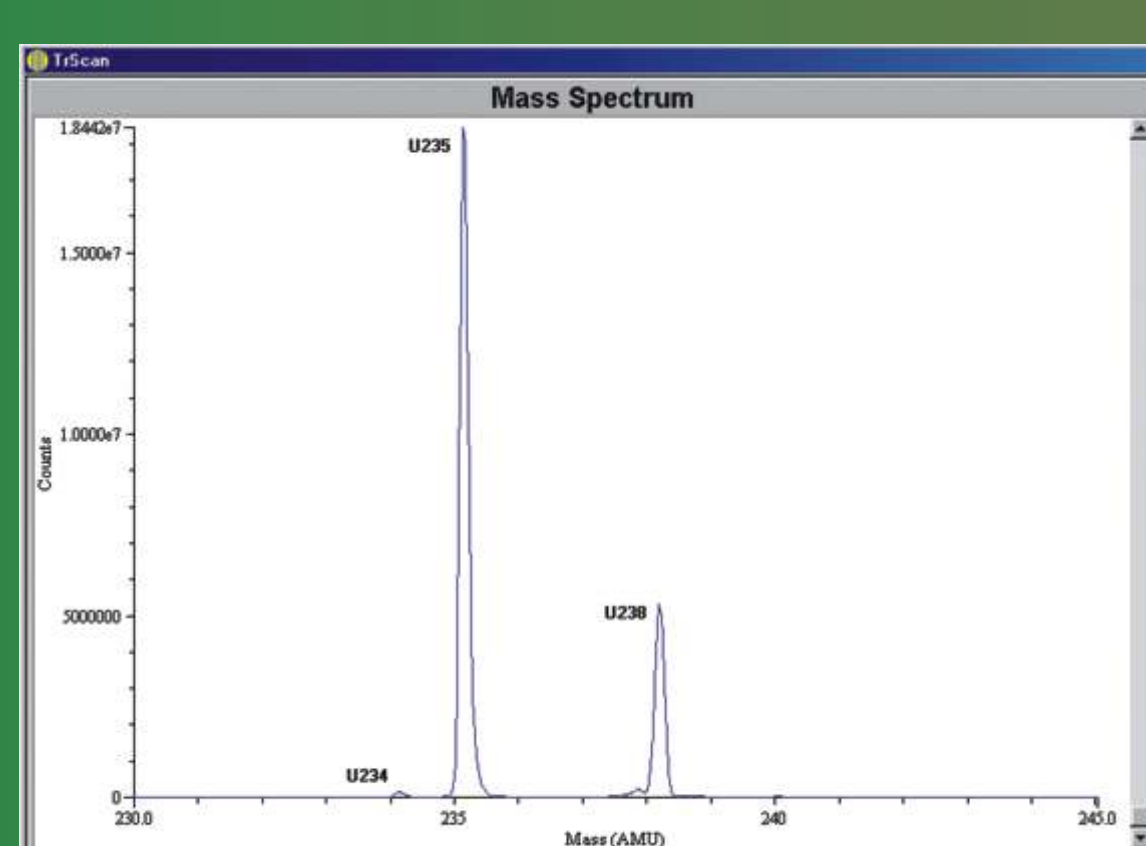


Fig 4. Zoom in from Fig 3 at AMU 230 to 245.

Sample introduction system consisted of a Burgener Peck Mira Mist Nebulizer and low-flow, low-power, single piece quartz torch. The combination of a Burgener Peck Mira Mist Nebulizer and the low sample aspiration rate (1.1 ml/min) enable operation to analyse the samples without clogging the nebulizer.

Auto-optimization of the Plasma, Ion optics, Orthogonal Accelerator and Reflectron parameters were done before the analysis. The same solution was used to calibrate both the mass spectrum and the SmartGate. This solution contained 10ppb of each of the following elements ${}^7\text{Li}$, ${}^{51}\text{V}$, ${}^{89}\text{Y}$, ${}^{115}\text{In}$, ${}^{133}\text{Cs}$, ${}^{197}\text{Au}$, ${}^{209}\text{Bi}$, ${}^{238}\text{U}$. This solution was prepared in the same matrix as the sample.

The SmartGate was then set to remove all ions from mass 5 to 100 amu. The high mass Uranium and Plutonium isotopes can then be easily analysed in the unique simultaneous multielement manner that is the trademark of the Optimass 8000 ICP-oTOF-MS. The mass and blunker calibration process took 1.5 minutes, with data acquisition set at 0.5 seconds.

Conclusion: Smartgate Ion Blunker is effectively able to blank the assign AMU as shown in Fig 3 - Fig 7.

Reference:

1. Operation Manual, Optimass 8000, September 2004, 01-0900-00, 91-112

To demonstrate the ability and performance of the SmartGate Ion Blunker, urine samples were scanned directly after 1/10 (v/v) dilution with 5% HNO_3 (v/v). Urine samples were obtained from a Gulf war soldier exposed to depleted Uranium. The elements of interest are ${}^{242}\text{Pu}$, ${}^{234}\text{U}$, ${}^{235}\text{U}$ and ${}^{236}\text{U}$. The lifetime of the detector can be significantly extended by using the SmartGate to remove the low mass ions. This reduces the total ion dose to the detector, hence extending the detector's lifetime.

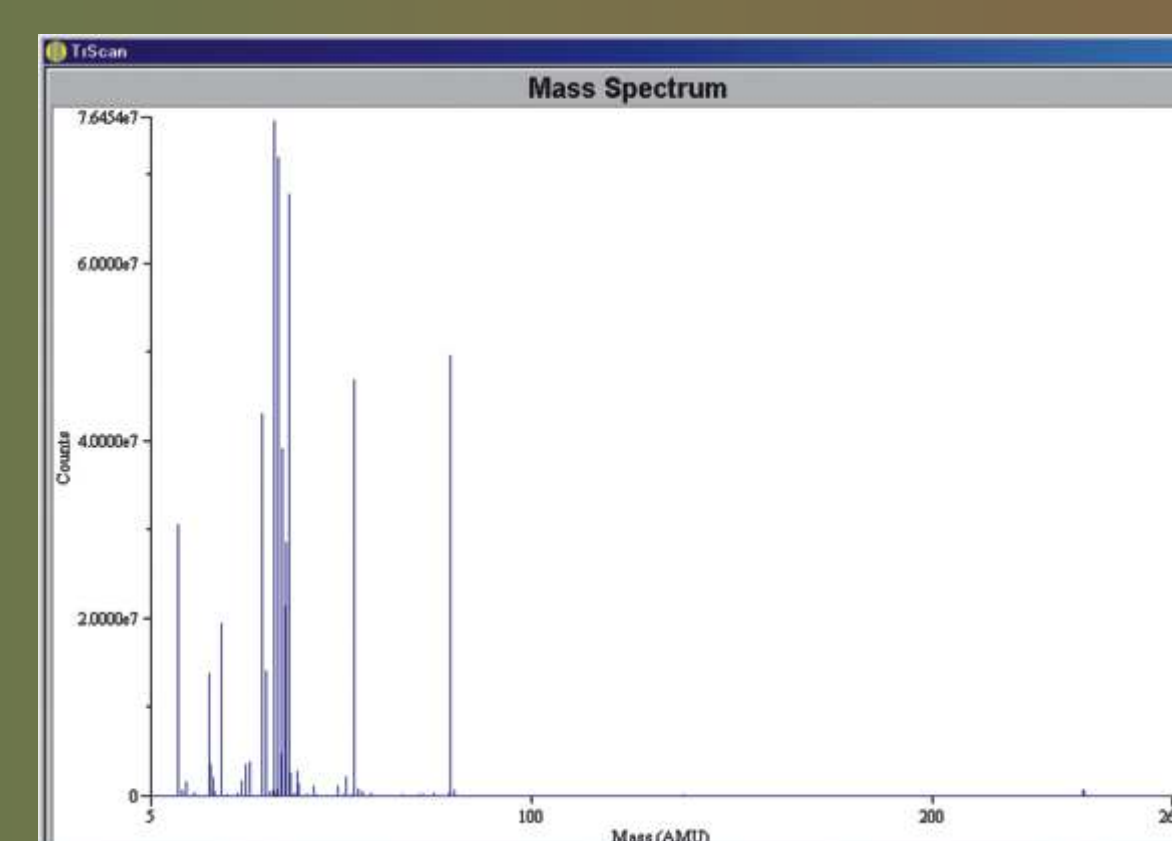


Fig 5. Optimass 8000 with 10 sec data acquisition and Blunker OFF for urine sample 2.

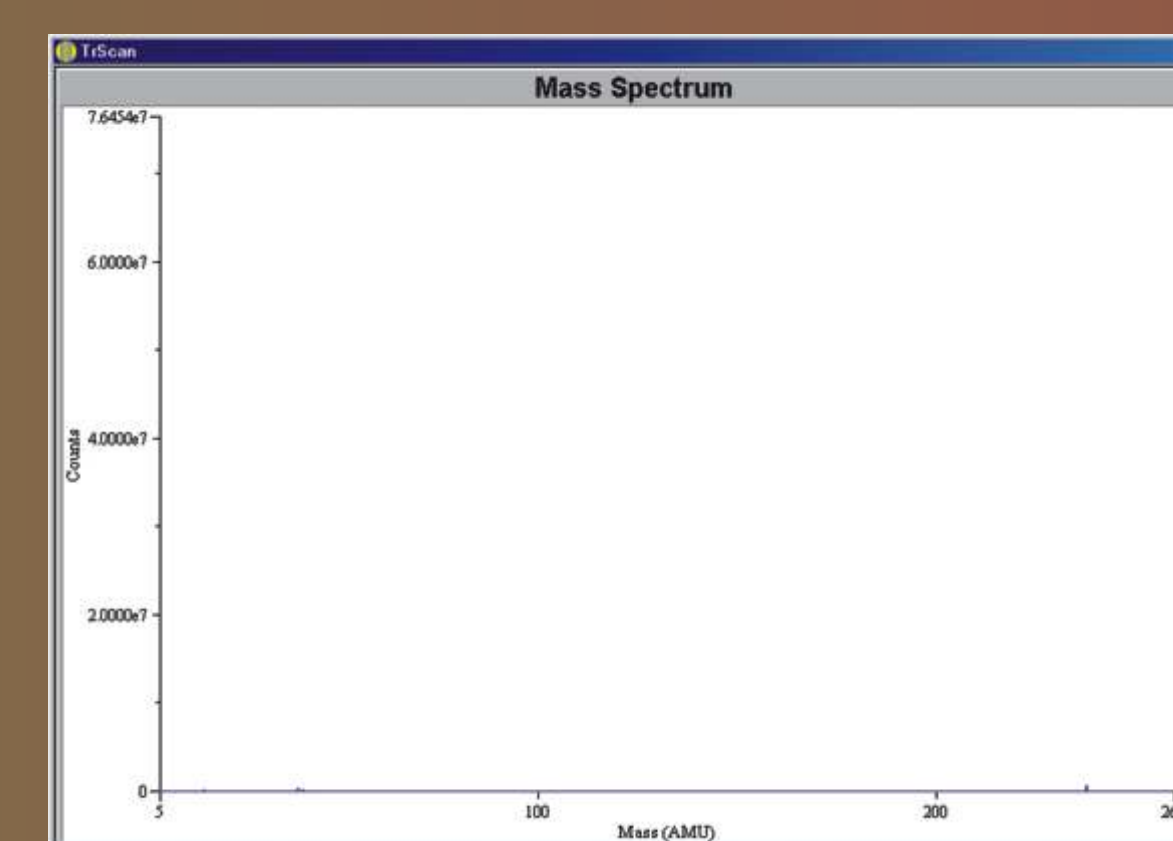


Fig 7. Optimass 8000 with 10 sec data acquisition and Blunker ON for urine sample 2.

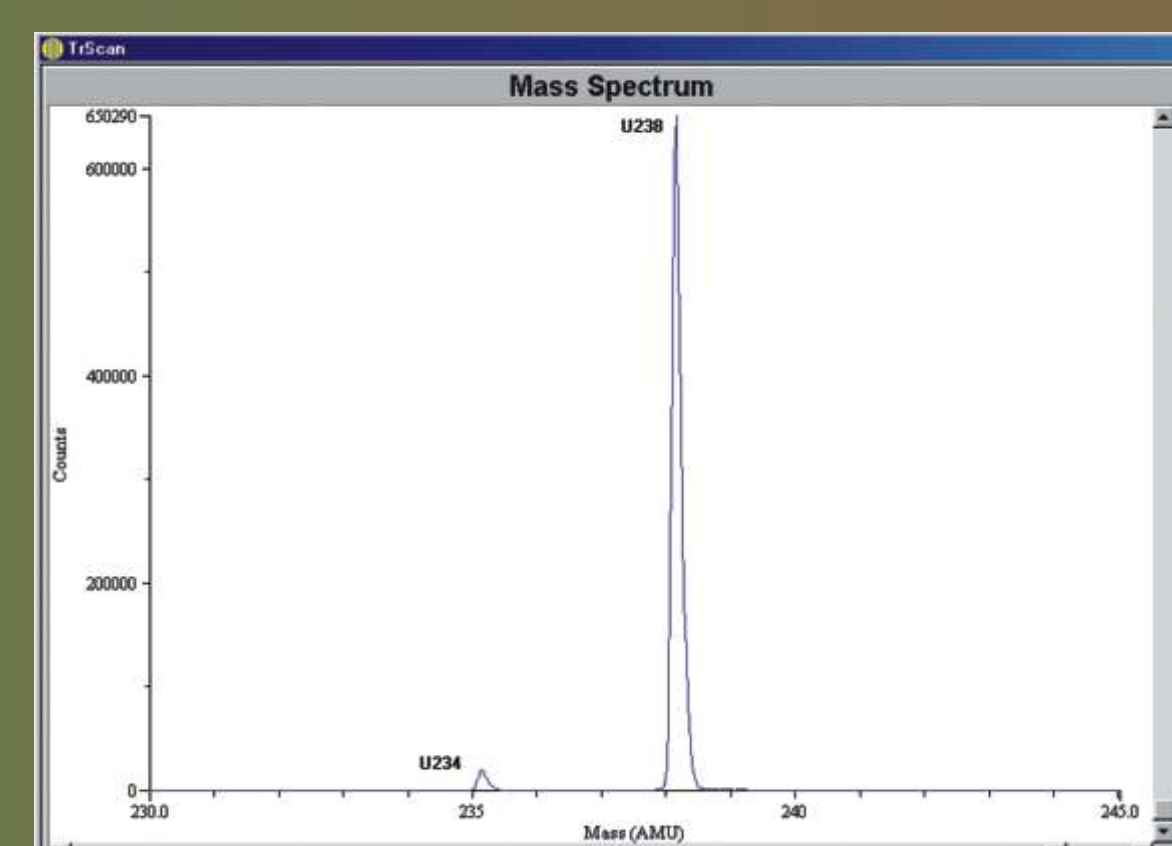


Fig 6. Zoom in from Fig 5 at AMU 230 to 245.

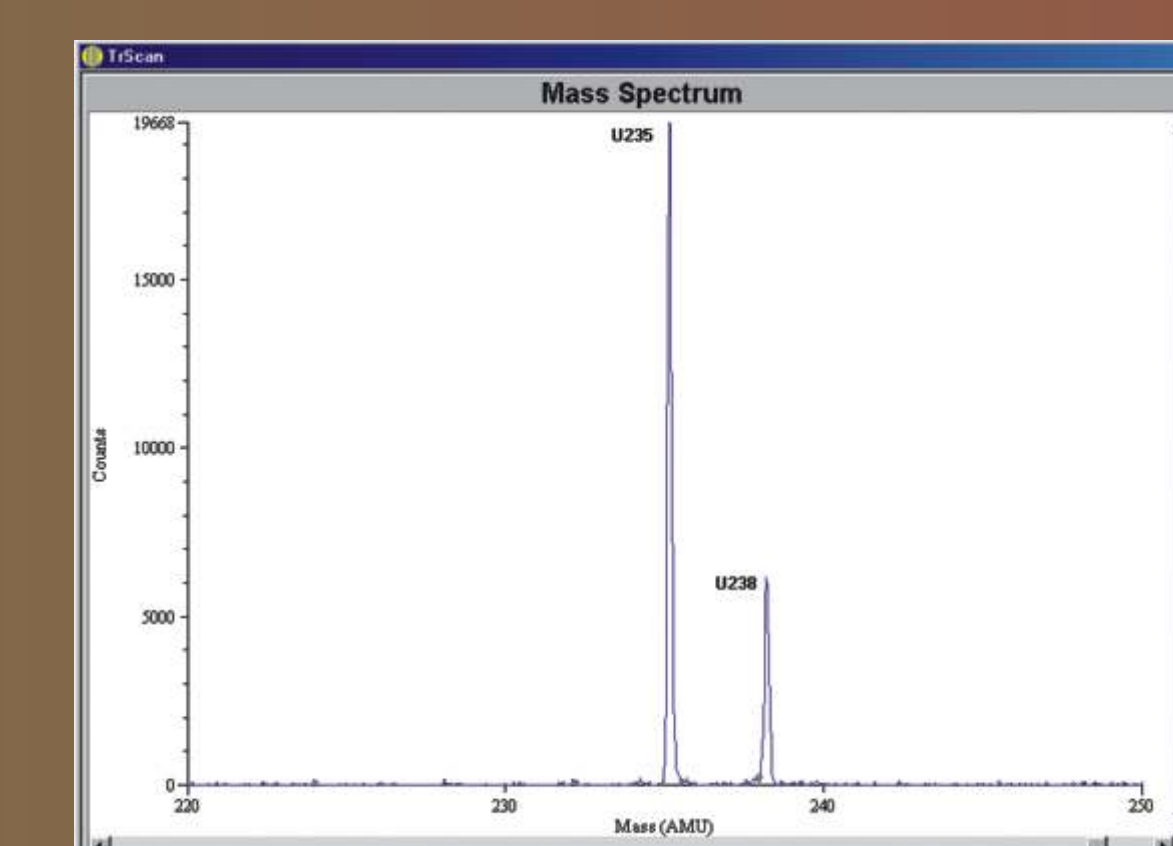


Fig 8. Zoom in from Fig 7 at AMU 220 to 250.