

1 Introduction

There exists a need to create a method for rapid and unambiguous identification of flammable oils, which can be used to help identify causes of accidental/arson fires. The goal of this project is to use a commercially available ambient ionization source, Direct Sample Analysis (DSA), with Mass Spectrometry (MS) to create mass libraries that can aid in the identification of forensics unknowns.

2 Instrumentation

The DSA ion source was mounted to a PerkinElmer AxION TOF MS. Reagent ion gas composition, flow rate, temperature, countercurrent heated gas flow rate, and purge gas flow rate were adjusted through software controls for optimum conditions. Liquid oil samples were introduced into the ion source individually on screens which were mounted on a two axis translator with sample position controlled through software.

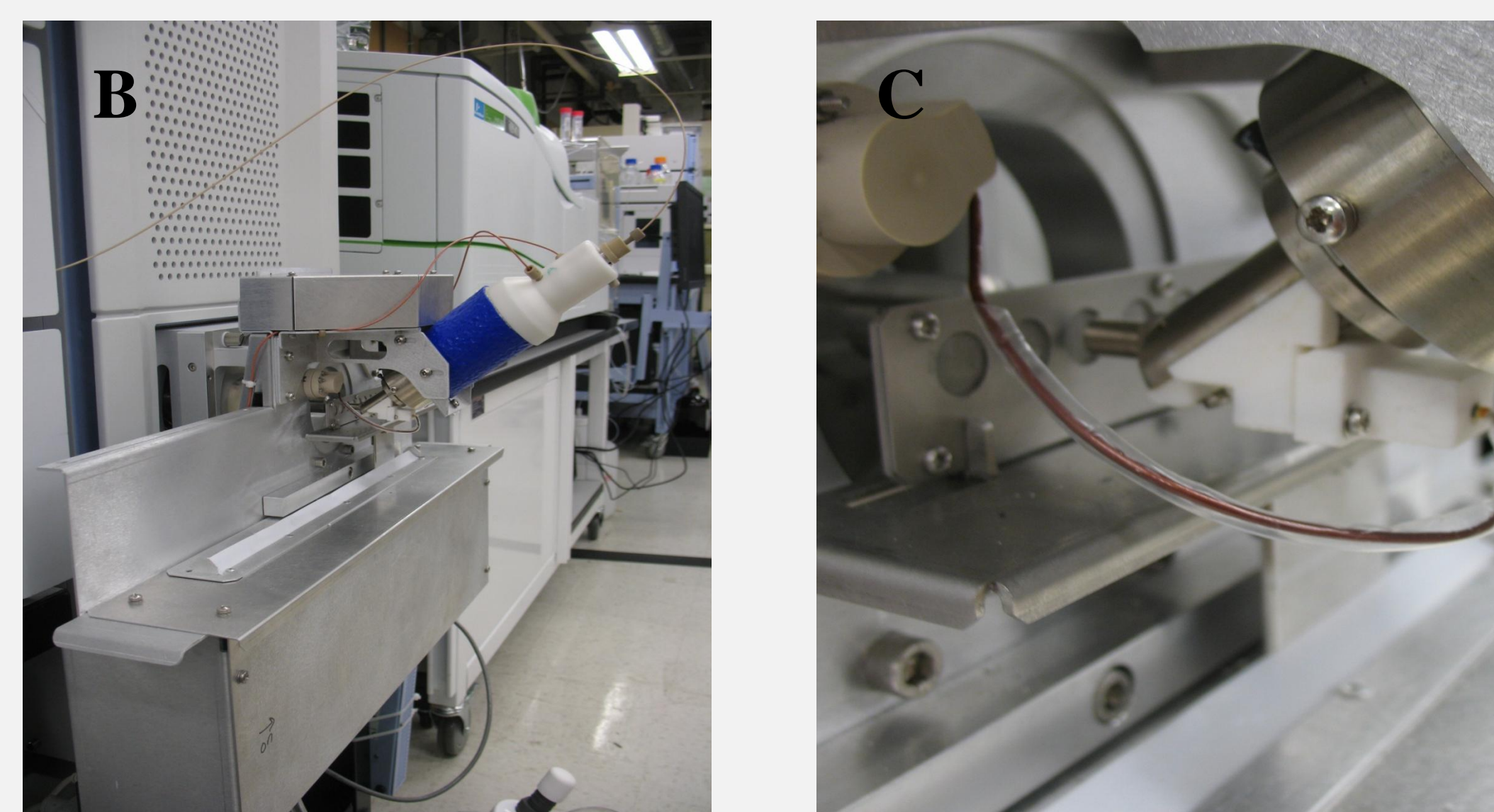
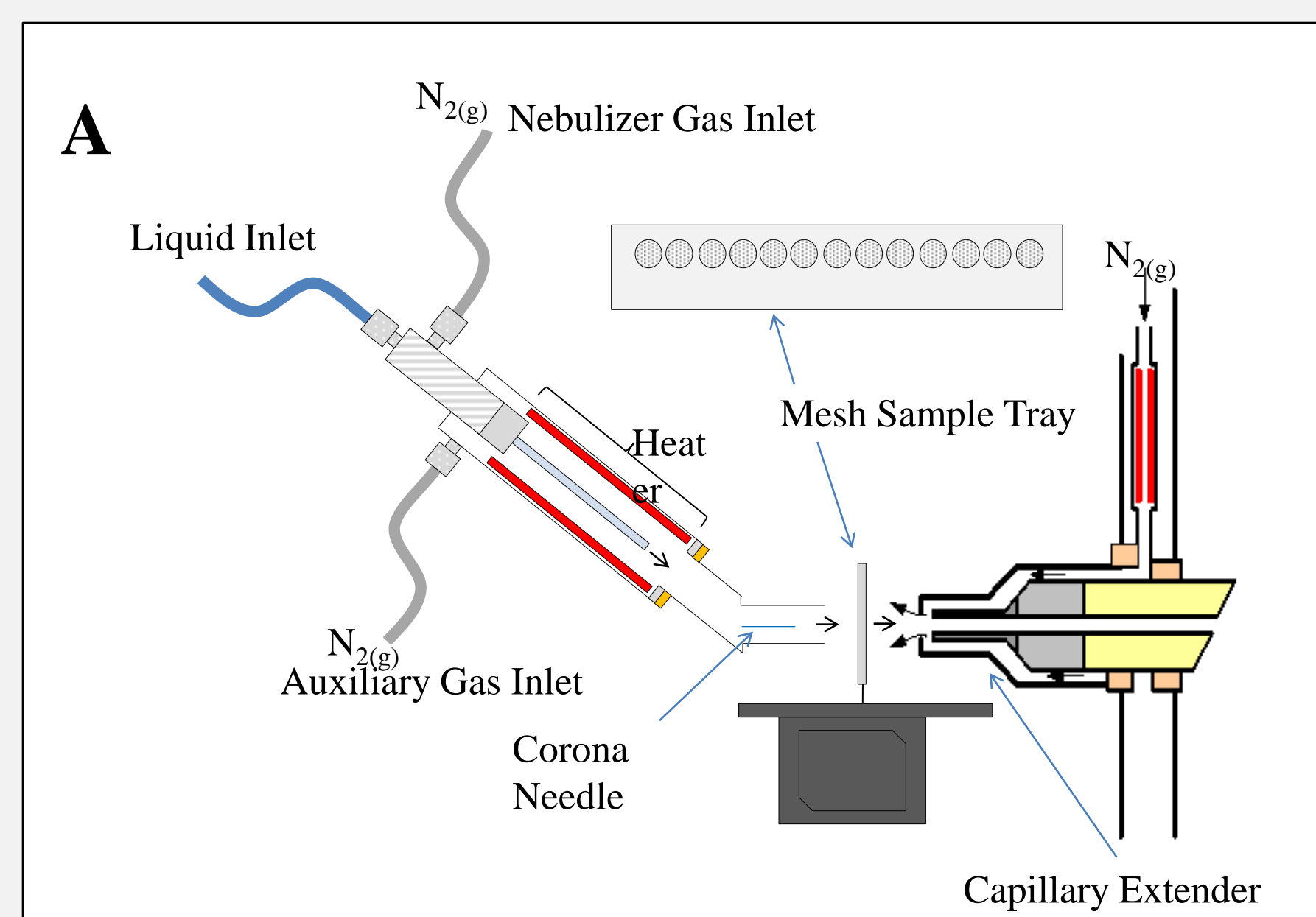


Figure 1A: Scheme of interworking components of DSA source. 1B: DSA source attached to the AxION TOF. 1C: Close up picture of the corona needle as well as mesh screen

3 Dissimilar Oils

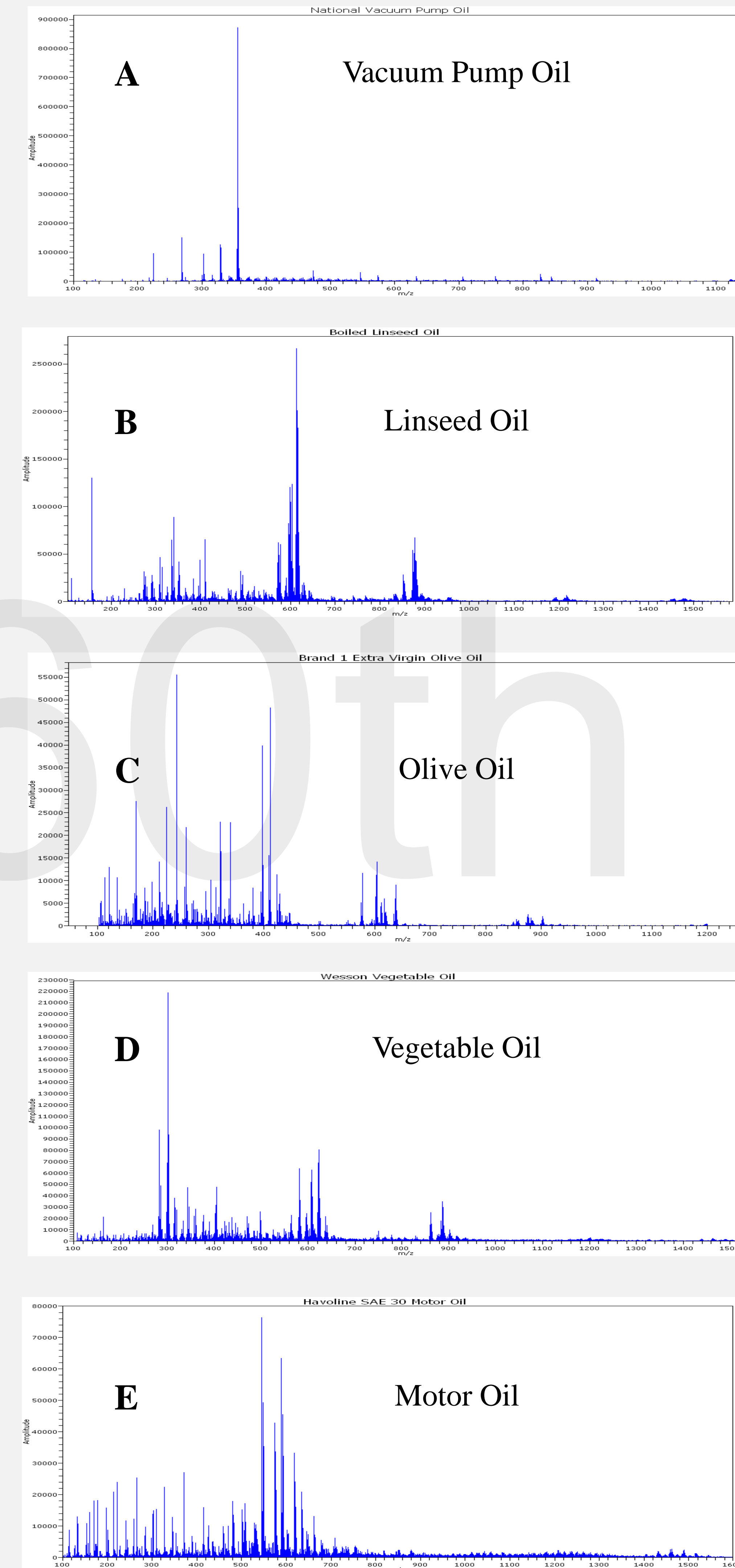


Figure 2: Representation of various oil samples which are considered flammable as seen by DSA Ionization on the AxION.

4 Similar Olive Oils

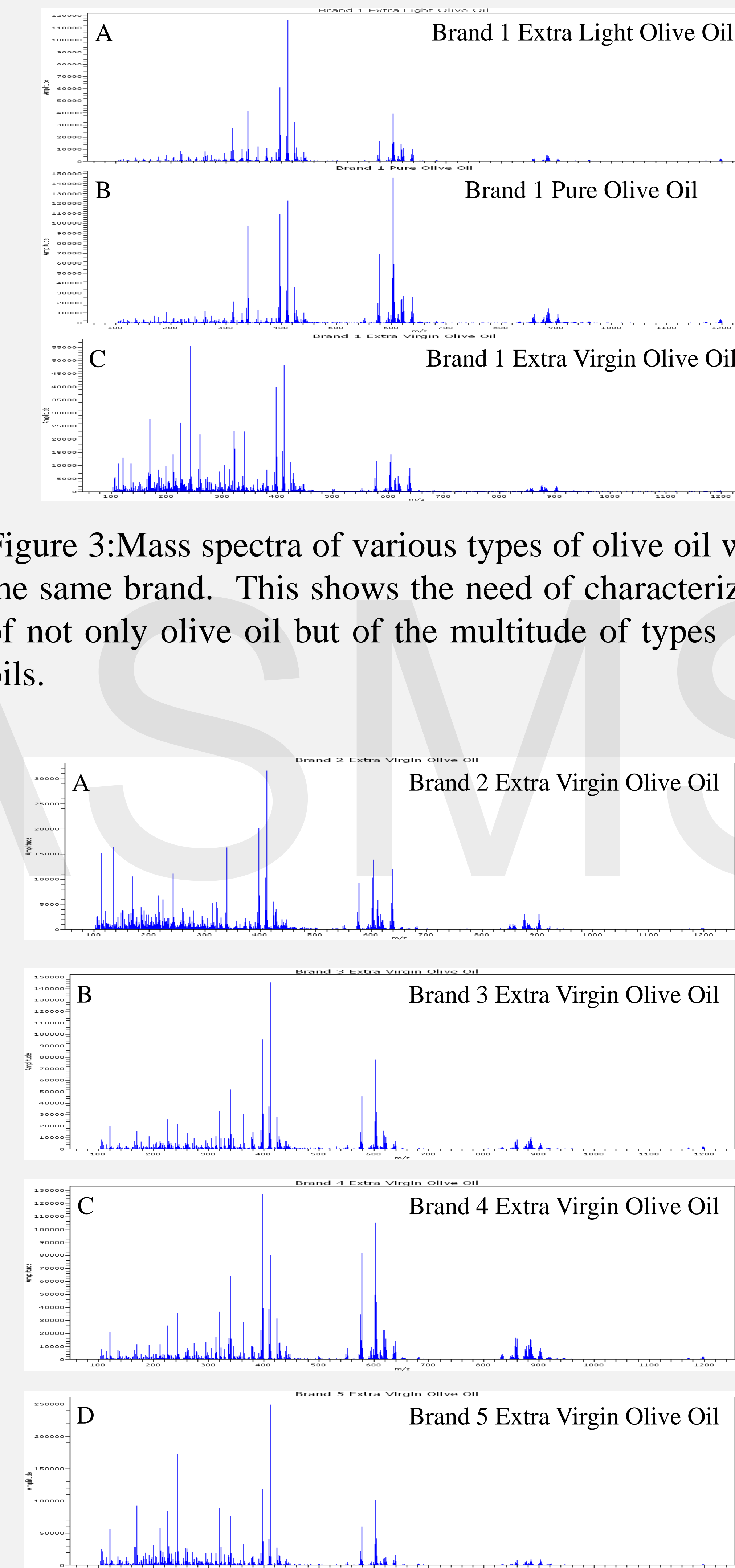
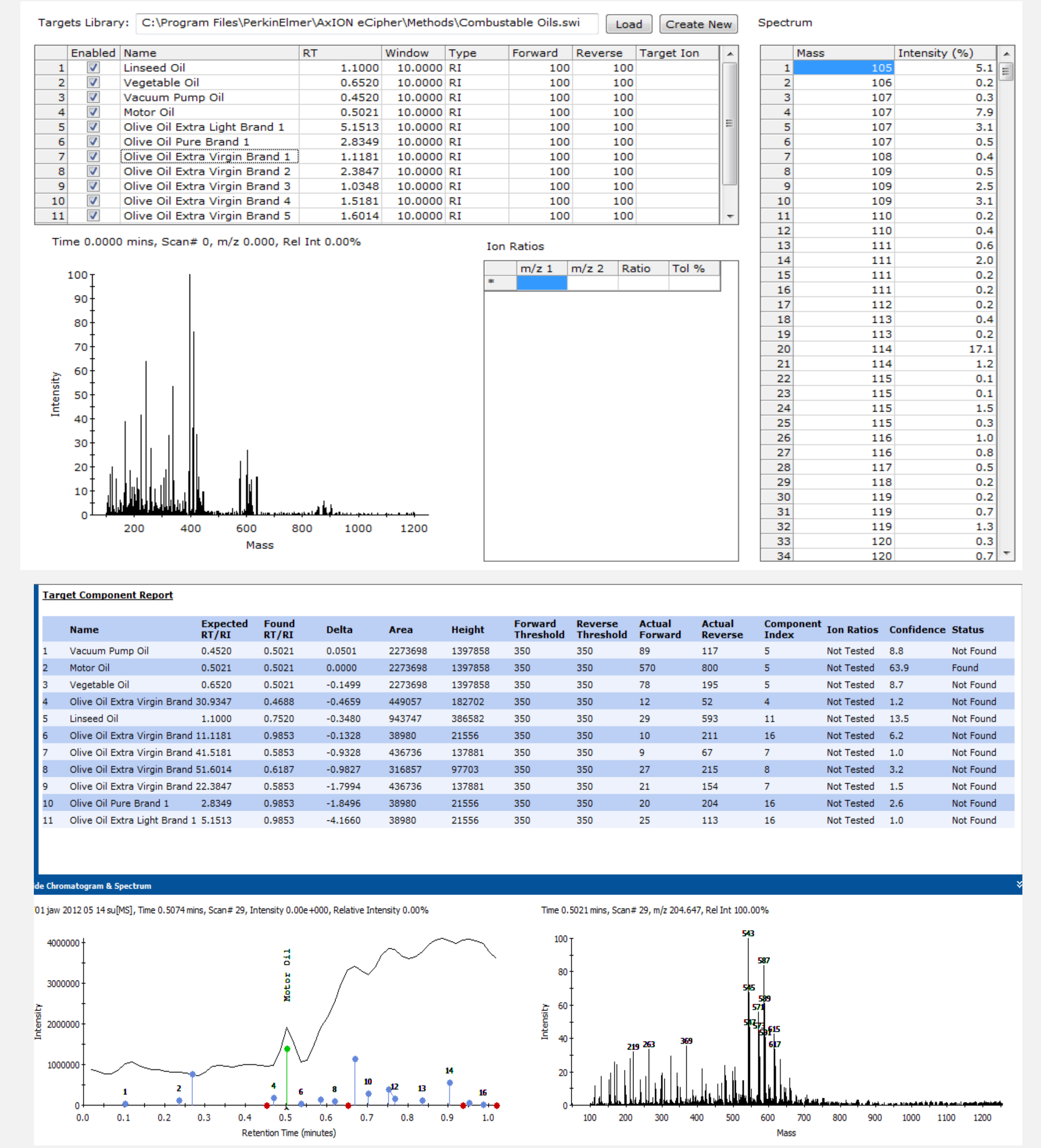


Figure 3: Mass spectra of various types of olive oil within the same brand. This shows the need of characterization of not only olive oil but of the multitude of types olive oils.

Figure 4: A demonstration of the differences which can be found within the same product, but with various manufactures. This study further proves the need to create extension libraries to appropriately identify unknowns

5 Libraries with eCipher

A screen shot of the program AxION eCipher (V 1.0.0.0 Build 2476). This software allows data to be captured and stored into target compounds list which can later be search against. This is a representation of the type of results that can be achieved with this software



6 Summary

We have shown the power of the DSA AxION TOF platform within the field of forensic science, specifically the identification of oil samples. The rapid analysis combined with high resolution and mass confidence can be used to unambiguously identify target compounds of combustible oil samples with little to no sample prep. Further work must continue to expand libraries to include not only more oils, but to included other products like explosives, fuel, and others

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