Results Interpretation and Explanation FAQs

1. **What is a "fingerprint" in the context of Scatr Series One?**

A fingerprint is the Raman spectrum obtained from that one specific location.

Raman spectroscopy measures how a material scatters light. When you shine a laser on a substance, most light bounces back unchanged, but a small amount changes slightly in energy because of how the molecules vibrate.

The Raman spectrum is a graph that plots these changes in energy. The peaks in the graph correspond to specific vibrations of the molecules in the material, helping to identify what is present. Each substance has a unique set of peaks, like a fingerprint. The software uses a point's fingerprint to compare to its database of reference fingerprints. Once the software has done this, the match results are presented in the signal strength chart seen on the webpage.

2. **How can the scan map and results be used together to analyze a sample?**

The map illustrates each point's location and the most predominant substance detected. This can be a visual aid to explain how the device scans across a sample.

3. **What might cause a weak signal other than low substance concentration?**

While a low amount of a substance is generally the main cause of weak signals, a few other factors may contribute to a substance's weak signal. If several other substances with stronger signals are present, these signals may interfere with or mask the substance with the weaker signal.

Another potential cause of weaker signals is that the laser could not adequately focus on the point to produce a clear fingerprint. If the laser cannot properly focus on a point, the device receives a "noisy" signal, meaning the peaks are unclear and difficult to distinguish. This prevents the software from confidently matching the signal.

4. **How does the software handle overlapping fingerprints in complex mixtures?**

When the sample is a mixture, the software analyzes the combined signals from all the substances in the sample. It then compares these signals to a database of known patterns to predict which substances are present. This process involves identifying the individual "fingerprints" of each substance within the mixture.

5. **What factors influence the accuracy of fingerprint matching?**

Several factors influence the accuracy of fingerprint matching. As noted earlier, the amount of a substance in a sample greatly influences the software's confidence in fingerprint matching. The more substance in a sample, the better the software can confidently match it to a reference.

Another factor is how effectively the laser can focus on the sample. A less focused point will decrease the accuracy of the collected fingerprint. If possible, keeping the sample flat and level when loading it into the Scatr chip provides the best results.

Lastly, having multiple substances present at a point challenges the software's ability to predict the composition accurately.

6. **What could cause a substance to be missed (a false negative result) in substance detection?**

The most probable cause of a false negative result is that the substance is present in such a small amount that its fingerprint signal is incredibly weak. Other stronger signals can often overpower a weak signal, preventing the software from detecting it.

7. **How does the system decide which signals to classify as unknown versus weak matches?**

A minimum level of similarity with a reference's fingerprint is required for the software to identify a match. If the point's fingerprint has too low of similarity to any reference fingerprint, it will be classified as unknown.

8. **What precautions should be taken when interpreting results for harm reduction?**

Precautions must be taken to communicate the results effectively. The ⓘ icon is an excellent resource for explaining to clients how the software predicts the substances in a sample. We do not recommend providing direction on consumption; instead, simply inform the client about their results so that they can make an educated decision. It is also important to remind clients that this device and software functions as a preliminary screen, and there is a possibility that certain substances may be missed.

9. **My client does not understand why a substance only appears in the results when both result models are shown; how should I explain this to them?**

The trace model is meant to find very small amounts of substances in a sample. If there is a low quantity of a substance, it produces a much weaker signal. The standard model only includes signals with higher signal strength because it can more confidently match these signals to their references. If the trace model detects a substance not reported in the standard model, the substance may be present in a low quantity. However, there is also the possibility that the substance reported was a false positive. In this case, using a test strip is recommended to confirm the presence of the substance in question.