Better Controlled Droplets to Enhance Repeatability

**original droplet side view**
- 130±2°
- d

**dried droplet top view**

**Q-SERS™ G1**
- High and well-controlled water contact angle
- Higher concentration of analyte
- More repeatable results

**Q-SERS™ G0**
- Lower and well-controlled water contact angle
- Good for hydrophobic based analytes

**Competitor**
- Not well-controlled water contact angle
- Unpredictable residue concentration
- Unpredictable results

0° or larger, not well controlled

Bigger size

>>d

Nonuniform and low concentration
Background: Q-SERS™ VS Competitor

Spectra acquired using 785 nm laser
Brilliant Cresyl Blue with Portable Raman

Normalized spectra acquired using 785 nm laser

- 500 ppb (1.3x10^{-6} M) by Q-SERS
- 100 ppb (2.6x10^{-7} M) by Q-SERS
- 100 ppb (2.6x10^{-7} M) by Competitor

Raman Shift (1/cm)

Intensity
Published Results (20 ppb Crystal Violet)

# Detection Limit of Q-SERS™ G1 and G0

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS</th>
<th>Formula</th>
<th>Portable Raman</th>
<th>Bench-top Raman</th>
<th>Portable Raman</th>
<th>Bench-top Raman</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2-Bis(4-pyridyl)ethane</td>
<td>4916-57-8</td>
<td>C₁₂H₁₂N₂</td>
<td>5ppm</td>
<td>200ppb</td>
<td>10ppm</td>
<td>1ppm</td>
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<tr>
<td>4-Mercaptopyridine</td>
<td>4556-23-4</td>
<td>C₅H₅NS</td>
<td>500ppb</td>
<td>200ppb</td>
<td>1ppm</td>
<td>200ppb</td>
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<tr>
<td>4-Methylbenzenethiol</td>
<td>106-45-6</td>
<td>CH₃C₆H₄SH</td>
<td>10ppm</td>
<td>2ppm</td>
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<tr>
<td>Azinphos-methyl</td>
<td>86-50-0</td>
<td>C₁₀H₁₂N₂O₃PS₂</td>
<td>2ppm</td>
<td>5ppm</td>
<td>5ppm</td>
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<tr>
<td>Brilliant Cresyl Blue</td>
<td>81029-05-2</td>
<td>C₁₇H₂₀N₃OCl · 1/2ZnCl₂</td>
<td>500ppb</td>
<td>100ppb</td>
<td>100ppb</td>
<td>50ppb</td>
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<tr>
<td>Carbaryl</td>
<td>63-25-2</td>
<td>C₁₂H₁₁NO₂</td>
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<td>10ppm</td>
<td>1ppm</td>
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<tr>
<td>Crystal Violet</td>
<td>548-62-9</td>
<td>C₂₅H₃₀ClN₃</td>
<td>200ppb</td>
<td>25ppb</td>
<td>200ppb</td>
<td>25ppb</td>
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<tr>
<td>Diquat Dibromide Monohydrate</td>
<td>6385-62-2</td>
<td>C₁₂H₁₂Br₂N₂ · H₂O</td>
<td>10ppm</td>
<td>5ppm</td>
<td>50ppm</td>
<td>5ppm</td>
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<tr>
<td>Malachite Green Chloride</td>
<td>569-64-2</td>
<td>C₂₃H₂₅ClN₂</td>
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<td>500ppb</td>
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<tr>
<td>Melamine</td>
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<td>1ppm</td>
<td>1ppm</td>
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<td>Phosmet</td>
<td>732-11-6</td>
<td>C₁₁H₁₂NO₄PS₂</td>
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<td>25ppm</td>
<td>5ppm</td>
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<tr>
<td>Rhodamine 6G</td>
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<td>C₂₈H₃₁N₂O₃Cl</td>
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<tr>
<td>Sulfamethazine</td>
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<td>5ppm</td>
<td>500ppb</td>
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<tr>
<td>Thiram</td>
<td>137-26-8</td>
<td>(CH₃)₂NCSS₂CSN(CH₃)₂</td>
<td>5ppm</td>
<td>2ppm</td>
<td>10ppm</td>
<td>2ppm</td>
</tr>
</tbody>
</table>

* Different results have been reported by users with different Raman spectrosopes, but not listed here.
** 1:1 ratio of water to acetonitrile was utilized for the solvent.
*** 785 nm wavelength laser used.
Other Characteristics

Specificity

SERS Spectra of Similar Structures

Semi-Quantitative Analysis

Melamine Concentration vs Raman Intensity

(100 ppb – 50 ppm)