Raman Spectrometer Lab Report

Test Objective: To evaluate the performance of the Raman spectrometer and calculate quantum defects based on the test data.

# Test Data

The following data was collected during the test:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sample Number | Wavelength (nm) | Intensity | Raman Peak (nm) | Resolution (FWHM, nm) | Quantum Defect |
| 1.0000 | 520.0000 | 526.3272 | 520.7809 | 0.5033 | 0.0011 |
| 2.0000 | 532.2222 | 414.6663 | 520.5059 | 0.5096 | 0.0012 |
| 3.0000 | 544.4444 | 478.9499 | 520.5792 | 0.4861 | 0.0009 |
| 4.0000 | 556.6667 | 505.9230 | 520.3754 | 0.4682 | 0.0011 |
| 5.0000 | 568.8889 | 475.2921 | 520.5615 | 0.5952 | 0.0010 |
| 6.0000 | 581.1111 | 658.2302 | 520.5820 | 0.4986 | 0.0009 |
| 7.0000 | 593.3333 | 568.7465 | 520.7387 | 0.5246 | 0.0011 |
| 8.0000 | 605.5556 | 484.6927 | 520.7513 | 0.5348 | 0.0009 |
| 9.0000 | 617.7778 | 556.6372 | 520.5911 | 0.6084 | 0.0009 |
| 10.0000 | 630.0000 | 581.9172 | 520.8025 | 0.4511 | 0.0010 |

# Equations

Quantum Defect Calculation:

$\Delta E = E\_n - E\_{n+1}$\nWhere: \n$\Delta E$ = Quantum Defect \n$E\_n$ = Raman Peak of the n-th sample \n$E\_{n+1}$ = Raman Peak of the (n+1)-th sample

# Quantum Defect Analysis

The calculated quantum defects are: [-0.2750262489510078, 0.07327381034383507, -0.20380634631658268, 0.1860888913844292, 0.020485396655658406, 0.15669515337276607, 0.012682269857464235, -0.16027880416424978, 0.21145225616794505]

Figure 1: Raman Spectra

