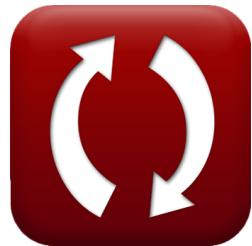


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Raman Spectroscopy Formulas

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List of 13 Raman Spectroscopy Formulas

Raman Spectroscopy ↗

1) Anti Stokes Scattering Frequency ↗

fx $v_{as} = v_{initial} + v_{vib}$

[Open Calculator ↗](#)

ex $33\text{Hz} = 31\text{Hz} + 2\text{Hz}$

2) Depolarization Ratio ↗

fx $\rho = \left(\frac{I_{perpendicular}}{I_{parallel}} \right)$

[Open Calculator ↗](#)

ex $8.421053 = \left(\frac{16\text{cd}}{1.9\text{cd}} \right)$

3) Electric Field given Polarizability ↗

fx $E = \frac{\mu}{\alpha}$

[Open Calculator ↗](#)

ex $599.7001\text{V/m} = \frac{400\text{C*m}}{0.667\text{C*m}^2/\text{V}}$



4) Energy 1 of Vibrational Level 

fx $E_1 = E_2 - (f_{1,2} \cdot [hP])$

Open Calculator 

ex $55J = 55J - (90\text{Hz} \cdot [hP])$

5) Energy 2 of Vibrational Level 

fx $E_2 = E_1 + (f_{1,2} \cdot [hP])$

Open Calculator 

ex $54J = 54J + (90\text{Hz} \cdot [hP])$

6) Frequency Associated to Transition 

fx $f = \frac{E_2 - E_1}{[hP]}$

Open Calculator 

ex $1.5E^33\text{Hz} = \frac{55J - 54J}{[hP]}$

7) Incident Frequency given Anti Stokes Frequency 

fx $v_0 = v_{as} - v_{vib}$

Open Calculator 

ex $32.5\text{Hz} = 34.5\text{Hz} - 2\text{Hz}$

8) Incident Frequency given Stokes Frequency 

fx $v_0 = v_s + v_{vib}$

Open Calculator 

ex $30\text{Hz} = 28\text{Hz} + 2\text{Hz}$



9) Molecular Dipole Moment ↗

$$fx \quad \mu = \alpha \cdot E$$

[Open Calculator ↗](#)

$$ex \quad 400.2 \text{C*m} = 0.667 \text{C*m}^2/\text{V} \cdot 600 \text{V/m}$$

10) Polarizability ↗

$$fx \quad \alpha = \frac{\mu}{E}$$

[Open Calculator ↗](#)

$$ex \quad 0.666667 \text{C*m}^2/\text{V} = \frac{400 \text{C*m}}{600 \text{V/m}}$$

11) Stokes Scattering Frequency ↗

$$fx \quad v_s = v_{\text{initial}} - v_{\text{vib}}$$

[Open Calculator ↗](#)

$$ex \quad 29 \text{Hz} = 31 \text{Hz} - 2 \text{Hz}$$

12) Vibrational Frequency given Anti Stokes Frequency ↗

$$fx \quad v_{\text{vib anti}} = v_{\text{as}} - v_0$$

[Open Calculator ↗](#)

$$ex \quad 4.5 \text{Hz} = 34.5 \text{Hz} - 30 \text{Hz}$$

13) Vibrational Frequency given Stokes Frequency ↗

$$fx \quad v_{\text{vib}} = v_0 - v_s$$

[Open Calculator ↗](#)

$$ex \quad 2 \text{Hz} = 30 \text{Hz} - 28 \text{Hz}$$



Variables Used

- E Electric Field (*Volt per Meter*)
- E_1 Energy Level 1 (*Joule*)
- E_2 Energy Level 2 (*Joule*)
- f Transition Frequency (1 to 2) (*Hertz*)
- $f_{1,2}$ Transition Frequency (*Hertz*)
- I_{parallel} Intensity of Parallel Component (*Candela*)
- $I_{\text{perpendicular}}$ Intensity of Perpendicular Component (*Candela*)
- v_0 Incident Frequency (*Hertz*)
- v_{as} Anti Stokes Frequency (*Hertz*)
- v_{initial} Initial Frequency (*Hertz*)
- v_s Stokes Scattering Frequency (*Hertz*)
- $v_{\text{vib anti}}$ Vibrational Frequency in Anti Stokes (*Hertz*)
- v_{vib} Vibrational Frequency (*Hertz*)
- α Polarizability (*Coulomb Square Meter per Volt*)
- μ Molecular Dipole Moment (*Coulomb Meter*)
- p Depolarization Ratio



Constants, Functions, Measurements used

- **Constant:** [hP], 6.626070040E-34 Kilogram Meter² / Second
Planck constant
- **Measurement:** Luminous Intensity in Candela (cd)
Luminous Intensity Unit Conversion 
- **Measurement:** Energy in Joule (J)
Energy Unit Conversion 
- **Measurement:** Frequency in Hertz (Hz)
Frequency Unit Conversion 
- **Measurement:** Electric Field Strength in Volt per Meter (V/m)
Electric Field Strength Unit Conversion 
- **Measurement:** Electric Dipole Moment in Coulomb Meter (C*m)
Electric Dipole Moment Unit Conversion 
- **Measurement:** Polarizability in Coulomb Square Meter per Volt (C*m²/V)
Polarizability Unit Conversion 



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