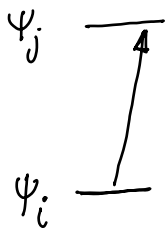


8. Selection rules for IR & Raman



$$M_{ij} = \langle \Psi_j | \mu | \Psi_i \rangle$$

interaction with radiation

Ψ_i transforms like $\Delta^{(i)}$

Ψ_j transforms like $\Delta^{(j)}$

Infrared (IR) absorption

$M_{ij} \neq 0$ iff $\Delta^{(p)} \times \Delta^{(j)} \times \Delta^{(i)}$ contains identity Γ_1

\downarrow
(x, y, z)

$\Delta^{(j)} \times \Delta^{(i)}$ OR

contains one of the components of $\Delta^{(p)}$ (x, y, z)

Raman scattering (inelastic light scattering)

\propto (differential) polarizability tensor

$M_{ij} \neq 0$ iff $\Delta^{(\alpha)} \times \Delta^{(j)} \times \Delta^{(i)}$ contains identity Γ_1

\downarrow
($x^2, y^2, z^2, xy, yz, zx$)

$\Delta^{(j)} \times \Delta^{(i)}$ OR

contains one of the components of $\Delta^{(\alpha)}$