Adapted from problem 7-12,

$$\dot{\mathbf{x}}_i = -\frac{i}{\hbar}(\mathbf{x}_i \hat{H} - \hat{H}\mathbf{x}_i) = i\omega \mathbf{x}_i$$

The squared magnitude of $i\omega$ in (9.57) is ω^2. It follows that

$$\int \frac{\omega}{2\pi\hbar c^3} \left(|j_{1,\mathbf{k}}|^2_{NM} + |j_{2,\mathbf{k}}|^2_{NM} \right) d\Omega = 2\, |\boldsymbol{\mu}_{NM}|^2 \int_0^{2\pi} \int_0^{\pi} \frac{\omega^3}{2\pi\hbar c^3} \sin\theta \, d\theta \, d\phi$$

From the following integrals

$$\int_0^{\pi} \sin\theta \, d\theta = 2 \qquad \int_0^{2\pi} d\phi = 2\pi$$

the combined multiplier is 4π hence

$$\frac{dP}{dt} = \frac{4\omega^3}{\hbar c^3} \, |\boldsymbol{\mu}_{NM}|^2$$