

Exam 3 Equation Sheet

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1 Constants

$$h = 6.626 \times 10^{-34} \text{ J} \cdot \text{s}$$

$$m_e = 9.11 \times 10^{-31} \text{ kg}$$

2 Quantum Mechanics

Wien's Displacement Law:

$$\lambda_{\text{max}} T = 0.2898 \times 10^{-2} \text{ m} \cdot \text{K}$$

Energy of a photon:

$$E = hf$$

Bragg's Law:

$$2d \sin \theta = m\lambda$$

Compton scattering:

$$\lambda - \lambda_0 = \frac{h}{m_e c} (1 - \cos \theta)$$

Momentum of a photon:

$$p = \frac{E}{c} = \frac{h}{\lambda}$$

De Broglie Wavelength:

$$\lambda = \frac{h}{p} = \frac{h}{mv}$$

Heisenberg uncertainty principle:

$$\Delta x \Delta p \geq \frac{h}{4\pi}$$

3 Nuclear Physics

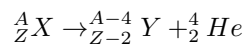
Half life:

$$T_{1/2} = \frac{\ln 2}{\lambda}$$

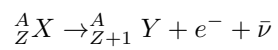
Exponential decay law:

$$N = N_0 e^{-\lambda t}$$

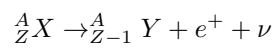
Alpha decay:



Beta plus decay:



Beta minus decay:



Gamma decay:

