

Name: _____

Date: _____

- [4 pt] 1. What two experiments lead to the proposal that light/energy is quantized and what two scientists are credited with explaining them?
- [4 pt] 2. Show an equation describing the relationship between energy and frequency, be sure to define each variable and show typical units for each. Is the energy of light directly proportional to or inversely proportional to the frequency of light?
- [3 pt] 3. Which has the greater energy, radiation type A with $\nu = 5.97 \times 10^{19} \text{s}^{-1}$ or radiation type B with $\nu = 5.97 \times 10^{10} \text{s}^{-1}$? Explain.
- [3 pt] 4. What is the energy (in kJ/mol) of photons with $\nu = 5.97 \times 10^{12} \text{s}^{-1}$?
- [4 pt] 5. Show an equation describing the relationship between energy and wavelength, be sure to define each variable and show typical units for each. Is the energy of light directly proportional to or inversely proportional to the wavelength of light?

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- [3 pt] 6. What is the energy (in kJ/mol) of photons with $\lambda = 2.57 \times 10^2 \text{ nm}$?
- [4 pt] 7. Define the De Broglie equation. Be sure to define each variable and show typical units for each. Is mass directly proportional or inversely proportional to the De Broglie wavelength. Explain.
- [3 pt] 8. What is the De Broglie wavelength of an electron with mass $9.11 \times 10^{-31} \text{ kg}$ and a velocity of $2.2 \times 10^6 \text{ m/s}$?
- [3 pt] 9. What is the De Broglie wavelength of a baseball with mass 0.25 lbs and a velocity of 100 mph.
- [4 pt] 10. Define the Heisenberg Uncertainty Principle equation. Be sure to define each variable and show typical units for each. Is the uncertainty in position directly proportional or inversely proportional to the uncertainty in momentum?