

1. C The law of simple multiple proportions states that when elements combine to form compounds, the weights of the constituents form ratios of small integers.
2. B Utilizing Planck's discoveries about the quantization of light energy, Bohr correlated the discrete energy differences in the line spectrum of hydrogen to quantized electron energy levels in the hydrogen atom.
3. C The energy of a photon is directly proportional to its frequency (inversely proportional to its wavelength) and is given by Planck's equation:

$$E = h\nu$$

4. D The principle quantum number, n , specifies the electron shell. The angular momentum quantum number, l , specifies the subshell within a certain shell. The magnetic quantum number, m_l , specifies the orbital within a subshell.
5. A The fact that electricity is required in definite amounts in certain chemical reactions led researchers to postulate the electrical nature of matter.
6. E A cathode ray is a beam of electrons. All of the statements are true.
7. D For an electron in a p orbital, all three statements are true.
8. C Review Hund's rule.
9. E Choice B is a ground state and the others are excited states. All are allowable.