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6. a) wavelength and frequency are inversely proportional, as wavelength increases, frequency decreases.
Thus, $c = \lambda\nu$ $\therefore \nu = \frac{c}{\lambda}$

b) energy and frequency are directly proportional, as frequency increases, energy increases.
Thus, $E = h\nu$

c) energy and wavelength are inversely proportional, as wavelength increases, energy decreases
Thus, $\nu = \frac{c}{\lambda}$ $\therefore E = h\left(\frac{c}{\lambda}\right)$

10. $\nu = ?$ Hz

$$\lambda = \frac{4.257 \times 10^{-7}\ \text{cm} \mid 1 \times 10^{-2}\ \text{m}}{\mid 1\ \text{cm}} = 4.257 \times 10^{-9}\ \text{m}$$

$c = \lambda\nu$

$$\nu = \frac{c}{\lambda} = \frac{3.00 \times 10^{8}\ \text{m/s}}{4.257 \times 10^{-9}\ \text{m}} = 7.05 \times 10^{16}\ \frac{1}{\text{s}} = \boxed{7.05 \times 10^{16}\ \text{Hz}}$$

11. $E = ?$ J

$\nu = 3.55 \times 10^{17}$ Hz $= 3.55 \times 10^{17}\ \frac{1}{\text{s}}$

$$E = h\nu = (6.626 \times 10^{-34}\ \text{J-s})(3.55 \times 10^{17}\ \tfrac{1}{\text{s}}) = \boxed{2.35 \times 10^{-16}\ \text{J}}$$

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14. $E = ?\ J$

$\lambda = 1.00 \times 10^{-3}\ nm \left| \frac{1 \times 10^{-9}\ m}{1\ nm} \right. = 1.00 \times 10^{-12}\ m$

$E = h\nu$

★ use $c = \lambda\nu$ to find ν, then plug ν into $E = h\nu$

$c = \lambda\nu$

$\nu = \frac{c}{\lambda} = \frac{3.00 \times 10^{8}\ m/s}{1.00 \times 10^{-12}\ m} = 3.00 \times 10^{20}\ \frac{1}{s}$

$E = h\nu = (6.626 \times 10^{-34}\ J \cdot s)(3.00 \times 10^{20}\ \frac{1}{s})$

$\boxed{E = 1.99 \times 10^{-13}\ J}$

35. a) Cl - $[Ne]3s^2 3p^5$

b) Ca - $[Ar]4s^2$

c) Se - $[Ar]4s^2 3d^{10} 4p^4$

38. a) boron b) fluorine c) magnesium d) silicon

47. $\nu = ?\ Hz$

$E = 1.55 \times 10^{-24}\ J$

$E = h\nu$

$\nu = \frac{E}{h} = \frac{1.55 \times 10^{-24}\ J}{6.626 \times 10^{-34}\ J \cdot s} = 2.34 \times 10^{9}\ \frac{1}{s} = \boxed{2.34 \times 10^{9}\ Hz}$