82. (a) From $kc = \omega$ where $k = 1.00 \times 10^6\ \text{m}^{-1}$, we obtain $\omega = 3.00 \times 10^{14}$ rad/s. The magnetic field amplitude is, from Eq. 34-5, $B = (5.00\ \text{V/m})/c = 1.67 \times 10^{-8}$ T. From the fact that $-\hat{\text{k}}$ (the direction of propagation), $\vec{E} = E_y\hat{\text{j}}$, and $\vec{B}$ are mutually perpendicular, we conclude that the only non-zero component of $\vec{B}$ is B_x, so that we have (in SI units)

$$B_x = 1.67 \times 10^{-8}\ \sin\left(\left(1.00 \times 10^6\right) z + \left(3.00 \times 10^{14}\right) t\right) .$$

(b) The wavelength is $\lambda = 2\pi/k = 6.28 \times 10^{-6}$ m.

(c) The period is $T = 2\pi/\omega = 2.09 \times 10^{-14}$ s.

(d) The intensity is

$$I = \frac{1}{c\mu_0}\left(\frac{5.00\ \text{V/m}}{\sqrt{2}}\right)^2 = 0.0332\ \text{W/m}^2 .$$

(e) As noted in part (a), the only nonzero component of $\vec{B}$ is B_x. The magnetic field oscillates along the x axis.

(f) The wavelength found in part (b) places this in the infrared portion of the spectrum.