

81. Since a mole of silver atoms has a mass of 0.108 kg, then the mass of one atom is

$$m = \frac{0.108 \text{ kg}}{6.02 \times 10^{23}} = 1.8 \times 10^{-25} \text{ kg} .$$

Using Eq. 16-12 and the fact that $f = \omega/2\pi$, we have

$$1 \times 10^{13} \text{ Hz} = \frac{1}{2\pi} \sqrt{\frac{k}{m}} \implies k = (2\pi \times 10^{13})^2 (1.8 \times 10^{-25}) \approx 7.1 \times 10^2 \text{ N/m} .$$