

715.

**Problem 49.34 (RHK)**

*Satellites and spacecraft in orbit about the Earth can become charged due, in part, to the loss of electrons caused by the photoelectric effect induced by the sunlight on the space vehicle's outer surface. Supposing that a satellite is coated with platinum, a metal with one of the largest work functions:  $\phi = 5.32$  eV, we have to find the smallest-frequency photon that can eject a photoelectron from platinum.*



**Solution:**

The work function of platinum is  $\phi = 5.32$  eV.

The smallest frequency photon that can eject a photoelectron will have frequency  $\nu$  such that its energy

$$h\nu = \phi$$

$$= 5.32 \text{ eV} = 5.32 \times 1.6 \times 10^{-19} \text{ J} = 8.51 \times 10^{-19} \text{ J}.$$

Therefore, the smallest-frequency photon that can eject a photoelectron from platinum will have frequency

$$\nu = \frac{8.51 \times 10^{-19}}{6.63 \times 10^{-34}} \text{ Hz} = 1.28 \times 10^{15} \text{ Hz}.$$

