

$$1) \quad \frac{1}{\lambda} = R_H \left(\frac{1}{n^2} - \frac{1}{k^2} \right)$$

$$\text{maximizing } \frac{1}{\lambda} \rightarrow \frac{1}{n^2} - \frac{1}{k^2} \text{ max.}$$

$$n = 1, k = \infty$$

$$\frac{1}{\lambda} = R_H \Rightarrow \boxed{\lambda = 90 \text{ nm}}$$

$$2) \quad \phi = 7 \text{ eV}$$

$$\frac{1}{2} m v_{\text{max}}^2 = h\nu - \phi$$

$$v_{\text{max}}^2 = \frac{2}{m} \left(\frac{hc}{\lambda} - \phi \right)$$

$$= \frac{2}{m} \left(\frac{1240 \text{ eV} \cdot \text{nm}}{90 \text{ nm}} - 7 \text{ eV} \right)$$

$$= \frac{2}{m} (13.6 \text{ eV} - 7 \text{ eV}) = \frac{13.2 \text{ eV}}{5.11 \times 10^{-5} \text{ eV}/c^2}$$

$$= 2.5 \times 10^{-5} \text{ c}^2$$

$$\boxed{v = 5 \times 10^{-3} \text{ c}}$$