Zad. 8.15.

Dane:

$\lambda = 95\,nm = 95 \cdot 10^{-9}\,m = 9{,}5 \cdot 10^{-8}\,m$

$h = 6{,}63 \cdot 10^{-34}\,J \cdot s$

$c = 3 \cdot 10^{8}\,\frac{m}{s}$

$E_n = -\frac{A}{n^2}$

$A = 13{,}6\,eV = 13{,}6 \cdot 1{,}6 \cdot 10^{-19}\,J = 21{,}76 \cdot 10^{-19}\,J = 2{,}176 \cdot 10^{-18}\,J$

$E_f = E_n - E_1$

$E_f = -\frac{A}{n^2} - \left(-\frac{A}{1^2}\right) = -\frac{A}{n^2} + A$

$E_f = \frac{hc}{\lambda}$

$\frac{hc}{\lambda} = -\frac{A}{n^2} + A$

$\frac{A}{n^2} = A - \frac{hc}{\lambda} \quad / : A$

$\frac{1}{n^2} = 1 - \frac{hc}{A\lambda}$

$n^2 = \frac{1}{1 - \frac{hc}{A\lambda}}$

$n = \frac{1}{\sqrt{1 - \frac{hc}{A\lambda}}}$

$$n = \frac{1}{\sqrt{1 - \frac{6{,}63 \cdot 10^{-34}\,J \cdot 3 \cdot 10^{8}\,\frac{m}{s}}{2{,}176 \cdot 10^{-18}\,J \cdot 3{,}5 \cdot 10^{-8}\,m}}}$$

$$n = \frac{1}{\sqrt{1 - \frac{19{,}89 \cdot 10^{-26}\,J \cdot m}{20{,}672 \cdot 10^{-26}\,J \cdot m}}}$$

$$n = \frac{1}{\sqrt{1 - 0{,}96217}}$$

$$n = \frac{1}{\sqrt{0{,}03783}}$$

$$n = \frac{1}{0{,}194499}$$

$$n \approx 5$$

Odp.: Główna liczba kwantowa stanu, do którego nastąpiło wzbudzenie była równa 5.