8.18

$R_H = 1{,}1 \cdot 10^7 \frac{1}{m}$, $c = 3 \cdot 10^8 \frac{m}{s}$

wzór: $\frac{1}{\lambda} = R_H \left(\frac{1}{k^2} - \frac{1}{n^2} \right)$ i $\lambda = \frac{c}{\nu}$

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

$\Downarrow$

$\nu = c \cdot R_H \cdot \left(\frac{1}{k^2} - \frac{1}{n^2} \right)$

a) seria dynowa $\Rightarrow k = 1$ trecia linia serii dynowa $\Rightarrow n = k+3 = 1+3 = 4$

$\nu_{4\to1} = 3 \cdot 10^8 \frac{m}{s} \cdot 1{,}1 \cdot 10^7 \frac{1}{m} \left(\frac{1}{1^2} - \frac{1}{4^2} \right) = 3{,}291 \cdot 10^{15} Hz \left(1 - \frac{1}{16} \right) =$

$= 3{,}291 \cdot 10^{15} Hz \cdot \frac{15}{16} \approx 3{,}1 \cdot 10^{15} Hz$

Odp: $\nu_{4\to1} \approx 3{,}1 \cdot 10^{15} Hz$

b) seria Bracketta $\Rightarrow k = 4$ pierwsza linia serii Bracketta $\Rightarrow n = k+1 = 4+1 = 5$

$\nu_{5\to4} = 3 \cdot 10^8 \frac{m}{s} \cdot 1{,}1 \cdot 10^7 \frac{1}{m} \left(\frac{1}{4^2} - \frac{1}{5^2} \right) = 3{,}291 \cdot 10^{15} Hz \left(\frac{25}{400} - \frac{16}{400} \right) =$

$= 3{,}291 \cdot 10^{15} Hz \cdot \frac{9}{400} \approx 7{,}4 \cdot 10^{13} Hz$

Odp: $\nu_{5\to4} \approx 7{,}4 \cdot 10^{13} Hz$