TL 4-39 Rydberg formula & Bohr model

a) $\Delta E = E_{16} - E_{15}$

$= -E_0 \left(\frac{1}{16^2} - \frac{1}{15^2} \right)$

E_0: 13.6 eV

$\Delta E =$ **2.89 meV** energy associated w/ transition from $n = 16$ to $n = 15$

b) ionization energy for atom in $n = 15$ state?

$\Delta E_{ionizatn} = -E_0 \left(\frac{1}{15^2} - \frac{1}{\infty^2} \right)$

$=$ **6.7 meV**

c) Since $E = hf$, $f = \frac{\Delta E}{h}$ ← transition energy

E: energy of photon; f: frequency of photon

$f = 6.99 \times 10^{11}$ Hz or **0.699 terahertz**

$\lambda = \frac{c}{f} =$ **429 μm**

d) $r_{15} = n^2 a_0 = (15)^2 (0.0529\ nm)$

$=$ **107 nm** or **2025 a_0**