

(5)

TALES:

$$\frac{mv^2}{r} = \frac{e^2}{4\pi\epsilon_0 r^2} \Leftrightarrow \frac{4\pi\epsilon_0}{e^2} = \frac{1}{rmv^2}$$

$$\text{si } r \gg a_0 = \frac{4\pi\epsilon_0}{e^2} \frac{\hbar^2}{m_e}$$

$$r \gg \frac{1}{rmv^2} \frac{\hbar^2}{m_e}$$

$$rmv^2 \gg \hbar^2$$

$$\text{or } r \gg 0$$

$$m \gg 0$$

$$v \gg 0$$

$$\hbar \gg 0$$

$$\text{donc } mvr \gg \hbar$$

$$|L| \gg \hbar$$

$$2) \Delta p \Delta x \gg \frac{\hbar}{2}$$

$$\text{donc } \Delta p \gg \frac{\hbar}{2\Delta x}$$

or ici $\Delta x = a$ car c'est le rayon atomique.

$$\Delta p_{\min} = \frac{\hbar}{2a}$$

$$\langle E \rangle = \frac{1}{2}mv^2 \quad \text{or } v = \frac{p}{m}$$

$$\langle E \rangle = \frac{1}{2}m \left(\frac{p^2}{m^2} \right)$$

$$\langle E \rangle = \frac{1}{2} \frac{p^2}{m}$$

$$p = mv$$

$$v = \frac{p}{m}$$

3) hydrogène $\lambda = 97,24 \text{ nm}$.

$$\Delta E = E_n - E_0 = -\frac{E_0}{n^2} + E_0$$
$$= E_0 \left(-\frac{1}{n^2} + 1 \right)$$

$$\text{et } \Delta E = \frac{hc}{\lambda}$$

$$\frac{\Delta E}{E_0} = -\frac{1}{n^2} + 1$$

$$-\frac{\Delta E}{E_0} + 1 = \frac{1}{n^2}$$

$$n^2 = \frac{1}{1 - \frac{\Delta E}{E_0}}$$

$$n^2 = \frac{E_0}{E_0 - \Delta E}$$

$$n = \sqrt{\frac{E_0}{E_0 - \frac{hc}{\lambda}}}$$

AN: $n=4$