

For hydrogen and hydrogen-like ions

The allowed energies are

$$E_n = - \frac{13.6 Z^2}{n^2} \quad n=1, 2, 3, \dots$$

n is the "principle quantum number".

and the wavefunctions are

$$\psi_{n\ell m_\ell} = R_{n\ell}(r) Y_\ell^{m_\ell}(\theta, \phi)$$

↑
given in Table 7.4 for $n=1, 2$ and 3 .
(your textbook)

For example

when $n=1 \rightarrow \ell=0$ and $m_\ell=0$

$$\psi_{100} = R_{10}(r) Y_0^0(\theta, \phi) \leftarrow \text{ground state wavefunction}$$

$$E_1 = -13.6 Z^2 \leftarrow \text{ground state energy}$$

from Tables

$$\psi_{100} = \frac{1}{\sqrt{\pi}} \left(\frac{Z}{a_0} \right)^{3/2} e^{-\frac{Zr}{a_0}}$$

For hydrogen atom: $Z=1$

For helium He^+ ion: $Z=2$ etc...