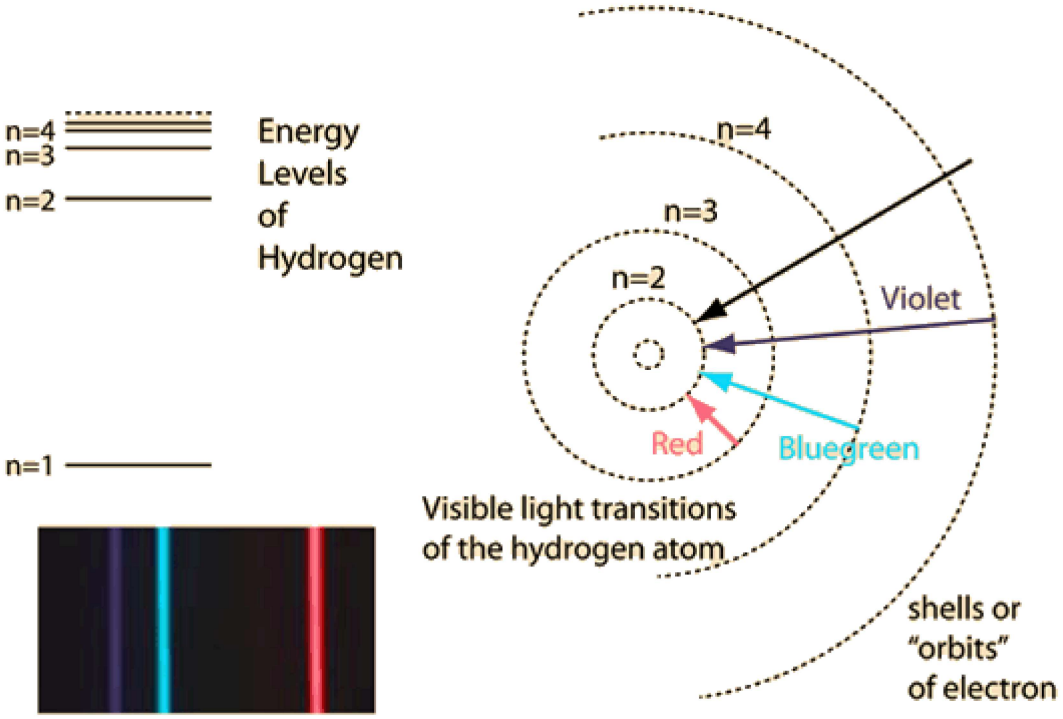
Quantized Energy States

The electrons in free atoms can only be found in certain discrete energy states. These sharp energy states are associated with the orbits or shells of electrons in an atom, e.g., a hydrogen atom. One of the implications of these quantized energy states is that only certain photon energies are allowed when electrons jump down from higher levels to lower levels, producing the hydrogen spectrum. The Bohr model successfully predicted the energies for the hydrogen atom, but had significant failures that were corrected by solving the Schrodinger equation for the hydrogen atom.



Scaled energy levels

Angular Momentum Quantization

In the Bohr model, the wavelength associated with the electron is given by the DeBroglie relationship

$$\lambda = \frac{h}{mv}$$

and the standing wave condition that circumference = whole number of wavelengths. In the hydrogenic case, the number n is the principal quantum number.

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