Bohr‘s Hydrogen Atom

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1 BOHR HYDROGEN ATOM

Niels Bohr introduced the atomic hydrogen model in 1913. The model was described as a positively charged nucleus, compromised of protons and neutrons, surrounded by a negatively charged electron cloud. The atoms held together by electrostatic forces between the positive nucleus and negative surroundings.Niels Bohr introduced the atomic hydrogen model in 1913. The model was described as a positively charged nucleus, compromised of protons and neutrons, surrounded by a negatively charged electron cloud. The atoms held together by electrostatic forces between the positive nucleus and negative surroundings.

$$E_n = \frac{E_1}{n^2}$$

E$_1 = -2.17 * 10^-18J$
$1eV = 1.6 * 10^-19$

$$-2.17 * 10^-18J * \frac{1eV}{1.6 * 10^-19} = 13.6eV = E_1$$

E$_n = \frac{-13.6}{n^2}$

$$E_1 = \frac{-13.6}{1^2} = -13.6eV$$

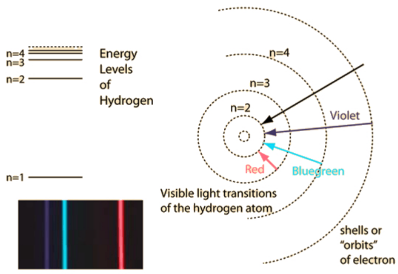
$$E_2 = \frac{-13.6}{2^2} = -3.4eV$$

$$E_3 = \frac{-13.6}{3^2} = -1.51eV$$

The Bohr model is used to describe the structure of hydrogen levels. The amount of energy in each level is written in eV and the maximum energy is the ionization energy. This calculation show how much energy needed to jump between levels where the energy is the difference in eV.

1.1 Hydrogen Spectrum

The movement of electrons between these energy levels produces a spectrum. The Balmer equation is used to describe the four different wavelengths of Hydrogen which are present in the visible light spectrum. These wavelengths are at 656=red, 486=blue-green, 434=blue-violet, and 410=violet nm. These correspond to the emission of photons as an electron in an excited state transitions down to energy level n=2.
The emission spectrum of a chemical element or chemical compound is the spectrum of frequencies of electromagnetic radiation emitted by an atom's electrons when they are returned to a lower energy state.



1.2 Rydberg Formula

The energy differences between levels in the Bohr model, and hence the wavelengths of emitted/absorbed photons, is given by the Rydberg formula

$$\frac{1}{\lambda} = R\frac{1}{n_0^2} - \frac{1}{n^2}$$

where n is the upper energy level, n is the lower energy level, and R is the Rydberg constant (1.097373 ÃŮ 107 mâĹŠ1). Meaningful values are returned only when n is greater than n and the limit of one over infinity is taken to be zero.

1.3 Transition

$$\lambda - m = \frac{91}{Z^2(\frac{1}{m^2} - \frac{1}{n^2})}$$