The Comparison of the Velocity of Light in Air with the Velocity of the Electron in the Orbit of the Atom of an Element

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The velocity of light in air or free space is represented by c [1] but the velocity of the electron in the orbit of the atom of an element is represented by $v = 2\pi Ze^2/nh$. This equation was derived on the basis of the Bohr postulates and the fact that the columbic force and the centrifugual force are equal [2]. The stated equation from a Bohr postulate is $v = nh/2\pi mr$ [2] and by substituting $r = n^2h^2/4\pi^2z$-em [2] into this equation, the $v = 2\pi Ze^2/nh$ equation is obtained.

It should be obvious from the $v = 2\pi Ze^2/nh$ equation that v is directly proportional to Z when n is constant and that v is inversely proportional to n when Z is constant. It also should be obvious that v is higher at n = 1 than when n is greater than one and this is for all Z.

Based on a five placed log table for calculations given that $v = c = 3 \times 10^{10}$ cm/sec with n = 1, $h = 6.626 \times 10^{-27}$ erg sec, $e = 4.806 \times 10^{-10}$ esu and $\pi = 3.142$, Z is approximately 137. This should imply that v can be calculated in terms of c exclusive of π, e and h from the equation $c = 137nv/Z$ or $c/v = 137n/Z$. In making the desired calculation, c does not have to be restricted to 3×10^{10} cm/sec always. It also can be 1.86×10^5 mi/sec, 3×10^8 m/sec, 3×10^5km/sec and other distance/time values. v and the other variables can be calculated in any problem based on this derivation.

The above derivation was based on the fact that the ratio of the velocity of light in air to the velocity of light in a medium of different optical density is the refractive index of that medium [3] and on the fact that the ratio of the velocity of an object to the velocity of sound in air is the Mach number of that object [4].

The velocity of the electrion in the fifth shell of the silver atom as an example of derivation is 2.0584×10^9 cm/sec or 1.2762×10^4 mi/sec.

References

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