ECE 495N

Fundamentals of Nanoelectronics

Fall 2008

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Lecture: 15
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Video Lectures posted at:
https://www.nanohub.org/resources/5346/

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The Schrödinger equation is given by:

\[ E \Psi = \left( -\frac{\hbar^2}{2m} \nabla^2 + U_N + U_e \right) \Psi \]

Where:
- \( E \) is the energy of the system
- \( \Psi \) is the wave function
- \( U_N \) and \( U_e \) are the nuclear and electron potentials, respectively
- \( \hbar \) is the reduced Planck constant
- \( m \) is the mass of the particle

The nuclear charges and atomic numbers are:
- \( Z = 1 \) for H
- \( Z = 3 \) for Li
- \( Z = 11 \) for Na
- \( Z = 19 \) for K
- \( Z = 6 \) for C
- \( Z = 8 \) for O
- \( Z = 10 \) for Ne
- \( Z = 18 \) for Ar

The electron configuration of Ge can be written as \( [Ar] 3d^{10} 4s^2 \)

Two hydrogen atoms (Helium atoms) can be represented as:

\[ \text{H}_2 \quad \text{H}_2 \]

The electron binding energy of \( \text{H}_2 \) is:

\[ E_{\text{H}_2} = U_{N,e} + U_{N',e} \]

The dissociation energy of \( \text{H}_2 \) is:

\[ E_{\text{H}_2} = E_{\text{H}_2} - E_{\text{H}_2^+} = U_{e} + U_{e} + U_{N,e} + U_{N',e} \]

The dissociation energy is measured in eV per molecule or KJ per mole.

The dissociation energy of \( \text{H}_2^+ \) is:

\[ E_{\text{H}_2^+} = U_{N,N} + U_{N,e} + U_{N',e} \]
$W_0 = \frac{1}{\sqrt{\pi}} \sqrt{\frac{K}{m}}$

good approximation as long as we are not going far away from equilibrium.