

ECE 495N

**Fundamentals of
Nanoelectronics**

Fall 2008

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**Lecture: 15
Title: Covalent Bonding
Date: October 03, 2008**

**Video Lectures posted at:
<https://www.nanohub.org/resources/5346/>**

**Class notes taken by: Panagopoulos Georgios
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Covalent Bonding

Lecture 15

Oct. 03, 2008

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

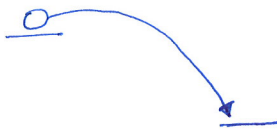
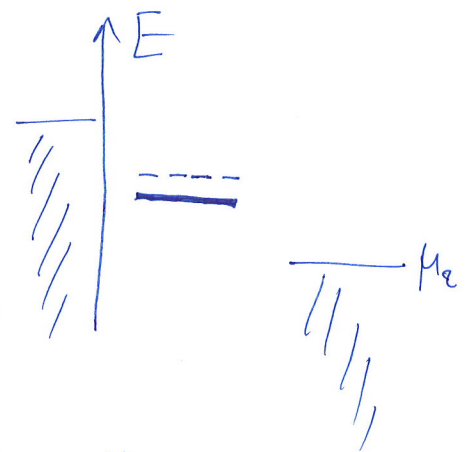
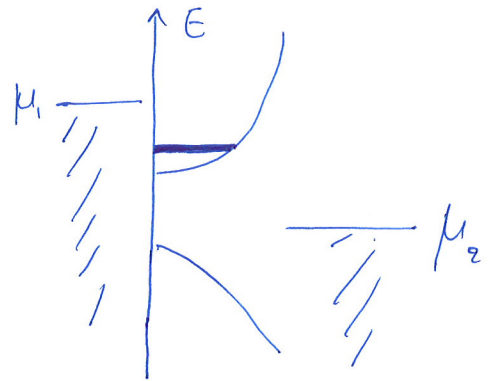
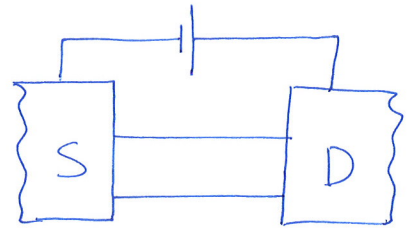
$\underbrace{-\frac{Ze^2}{4\pi\epsilon_0 r}}_{U_e}$

Z=1
H
3 Li
11 Na
19

⁶C
¹⁴Si

2 He
Ne¹⁰
Cl 18
36

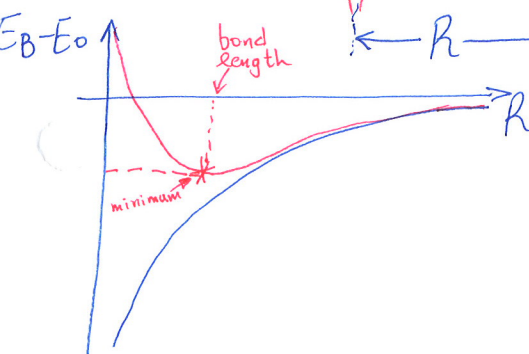
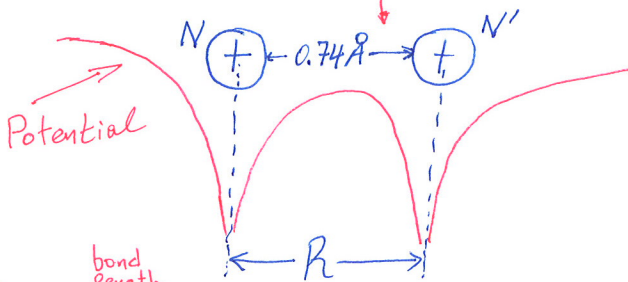
20 ³²Ge



Two hydrogen atoms (Helion atoms)

$$-13.6 \text{ eV} = E_0 \quad \text{---} \text{e} \quad \text{---} \text{e}'$$

E_B



$$E(2H) = U_{N,e} + U_{N',e}$$

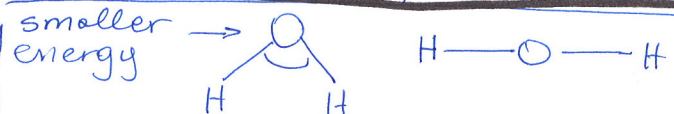
$$E(H_2) = U_{N,N} + U_{e,e'} + U_{N,e} + U_{N',e}$$

is $E(H_2) < E(2H)$

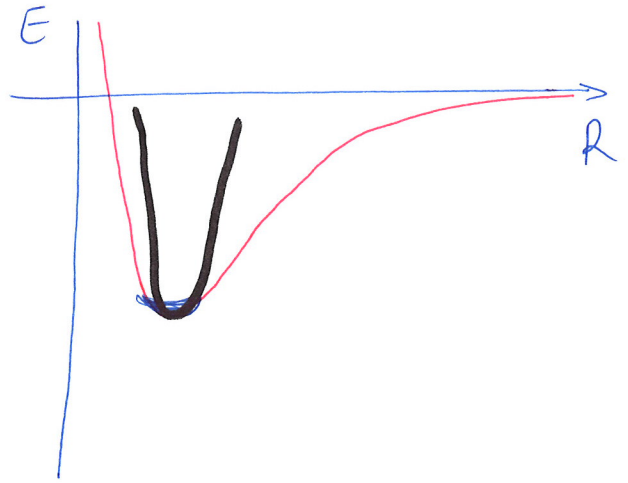
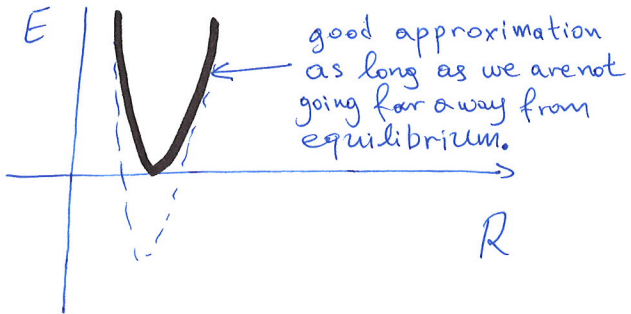
Dissociation Energy: eV/molecule
KJ/mole
Kcal/mole

$$E(H_2^+) = U_{N,N} + U_{N,e} + U_{N',e}$$

$$E(H_2) - E(H_2^+) = U_{e,e'} + U_{N,e} + U_{N',e}$$



| 0.74 Å |



$$\omega_0 = \frac{1}{2\pi} \sqrt{\frac{K}{m}}$$

