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/

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PURDUE UNIVERSITY

Covalent Bonding

Lecture 15

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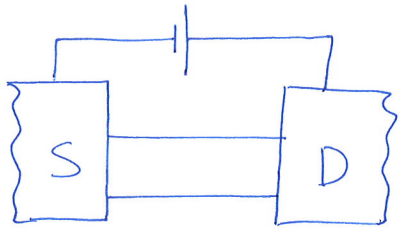
$$E\Psi = \left(-\frac{\hbar^2}{2m}\nabla^2 + \underbrace{U_N}_{-\frac{Zq^2}{4\pi\epsilon_0 r}} + U_e\right)\Psi$$



$Z=1$ H

3 L_i

11 Na

19

20

^{6}C

^{14}Si

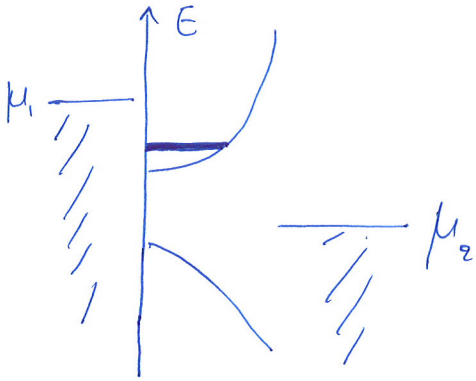
^{32}Ge

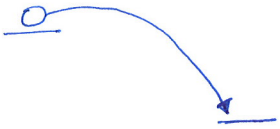
2 He

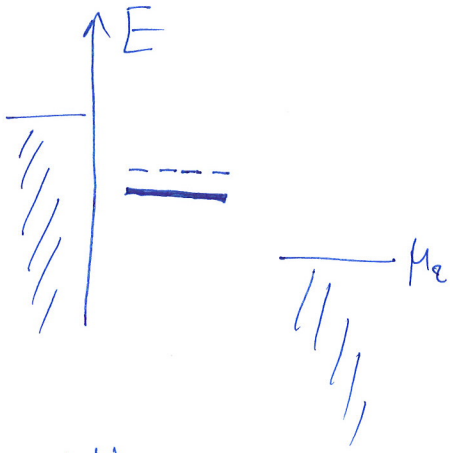
Ne 10

Cl 18

36



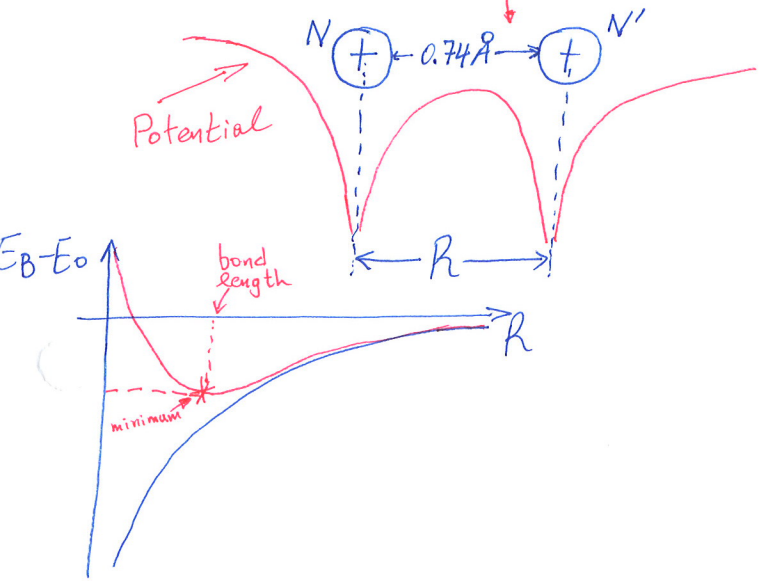




Two hydrogen atoms (Helion atoms)

$-13.6\,eV = E_0$

E_B



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

$E(H_2) = U_{N,N} + U_{e,e'} + \underbrace{U_{N,e} + U_{N',e}}_{E_B} + \underbrace{U_{N,e'} + U_{N',e'}}_{E_B}$

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

Dissociation Energy: eV/molecule

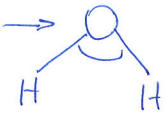
KJ/mole

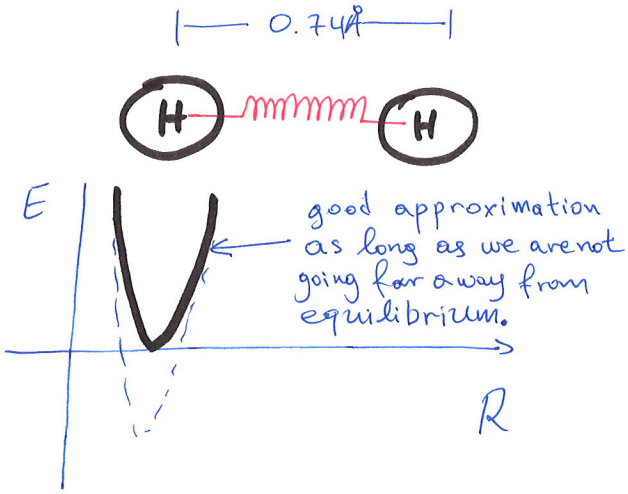
Kcal/mole

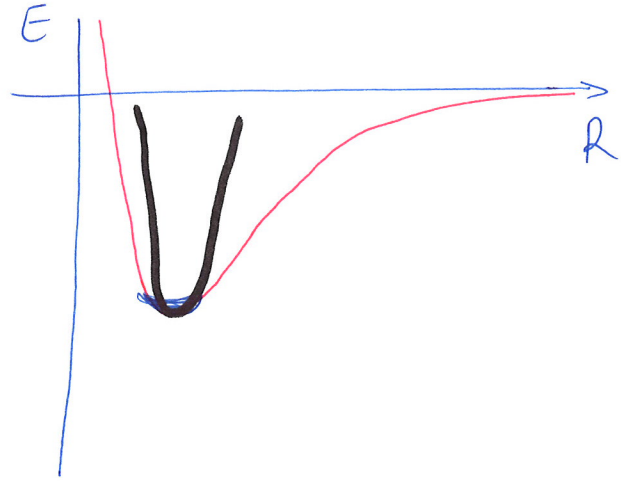
$E(H_2^+) = U_{N,N} + U_{N,e} + U_{N',e}$

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

smaller energy →







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