

Session #10: Homework Problems

Problem #1

One of the two compounds, NH_3 or BF_3 , is found to exhibit a permanent dipole moment. Identify the polar species and account for the different bonding characteristics of the two species. (Make appropriate sketches of the respective bonding configurations.)

Problem #2

- (a) Determine the inter-ionic equilibrium distance between the sodium and chlorine ions in a sodium chloride molecule knowing that the bond energy is 3.84 eV and that the repulsive exponent is 8.
- (b) At the equilibrium distance, how much (in percent) is the contribution to the attractive bond energy by electron shell repulsion?

Problem #3

Boron (B) reacts with bromine (Br_2) to form a compound which is not polar (does not have a dipole moment).

- (a) Give the compound formed in Lewis notation.
- (b) List all bonding orbitals which on orbital overlap lead to the formation of this compound.
- (c) Do you expect the compound to exhibit a dipole moment or not? Why?

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