

PHY 491, Fall 2024 - Homework 3

DUE: Friday 09/20/24, 11:59pm

Problem 3.1 Given are the following electron configurations $1s^2 2s^2 2p^6 3s^2 3p^5$ and $[Ar] 4s^2 3d^6$

3.1.1 Find the elements corresponding to these electron configurations. (2 points)

3.1.2 What type of magnetism do you expect for both and why? (4 points)

Problem 3.2 Assuming full shielding by all electrons in shells with $n < n_{valence}$,

3.2.1 Calculate the first ionization energy of S. (4 points)

3.2.2 Is this assumption realistic? Discuss. (3 points)

Problem 3.3 Disulfur is the diatomic molecule with the formula S_2 . It is analogous to the dioxygen molecule but rarely occurs at room temperature.

3.3.1 Sketch the molecular orbital diagram for S_2 in its ground state. (4 points)

3.3.2 Calculate the bond order. What can you say about the stability of S_2 based on the result? (3 points)