Molecular Orbital Theory - Study Guide

*section 8.4 in OpenStax*

**Molecular Orbitals**

Two atomic orbitals can combine to form two types of molecular orbitals.

1. The in-phase combination is lower energy and called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. The out-of-phase combination is higher energy, denoted with an asterisk, and called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Complete the table below to classify the type of bond.

|  |  |  |
| --- | --- | --- |
| Molecular Orbital Shape | Sigma or pi? | Bonding or antibonding? |
| CNX_Chem_08_04_ssigma.jpg |  |  |
| CNX_Chem_08_04_pMOsigma.jpg |  |  |
| CNX_Chem_08_04_pMOpi.jpg |  |  |
| CNX_Chem_08_04_ssigma.jpg |  |  |
| CNX_Chem_08_04_pMOsigma.jpg |  |  |
| CNX_Chem_08_04_pMOpi.jpg |  |  |

**Molecular Orbital Diagrams**

In a molecular orbital diagram, each horizontal line represents \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and each can hold \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons.

The equation to determine bond order is:

Use the molecular orbital diagram of Be2+ (Figure 8.34) to calculate the bond order.

**End of Chapter 8 Practice Problems**

#41a-c

For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”