Ch. 5 - Exercise 5.7 - Draw an MO Diagram for N₅

\[ N = N = N \]

descend in symmetry

\[ \text{D}_{1h} \rightarrow \text{D}_{2h} \]

\[ \begin{array}{c|cccccc}
\Gamma_{2s} & E & C_{2v} & C_{2v} & C_{2v} & \Phi_{x^2-y^2} & \Phi_{z^2} \\
\Gamma_{2p_x} & 2 & 2 & 0 & 0 & 0 & 0 \\
\Gamma_{2p_y} & 2 & 2 & 0 & 0 & 0 & 0 \\
\Gamma_{2p_z} & 0 & 0 & 0 & 0 & -2 & 2 \\
\end{array} \]

Outer Atoms \( \rightarrow \) formed by reducing the reducible representations

\[ \Gamma_{2s} = \text{Ag} + \text{Bu} \quad \Gamma_{2p_x} = \text{Bu} + \text{Bz} \]

Central Atom \( \rightarrow \) easy to tell symmetries of central atom by looking at irreducible representations with \( \phi_y, \phi_z \) symmetries

\[ \Gamma_{2s} = \text{Ag} \quad \Gamma_{2p_x} = \text{Bs} \quad \Gamma_{2p_y} = \text{Bz} \]

\[ \rightarrow Z_{2p} = -15eV \rightarrow 2p\text{'s will interact with each other} \]

\[ \rightarrow Z_{2s} = -27eV \rightarrow 2s\text{'s will interact with each other} \]

\( \rightarrow 2s\text{'s and } 2p\text{'s will have minimal interaction} \)
$N^+$

$\rightarrow 2\text{ }5\text{ }\text{bonds}$
$\rightarrow 2\text{ }\pi\text{ }\text{bonds}$
$\rightarrow 3\text{ }\text{Lone Pairs}$

Doesn't fully match our Lewis Dot Structure. One lone pair is likely delocalized. One pair of electrons from our structure is probably delocalized between all 3 $N$'s.