

1. Methyl isocyanate (CH_3NCO) is a toxic compound commonly used in the production of pesticides.
 - (a) Draw the Lewis structure for CH_3NCO . Include all bonds, lone pairs, and any formal charges.
 - (b) Estimate the $\text{C}-\text{N}-\text{C}$ bond angle and explain why.
 - (c) On your Lewis structure, indicate the hybridization of the C and N atoms.
 - (d) How many σ -bonds and π -bonds are present in CH_3NCO .
2. Draw each of the following molecules showing their geometry clearly. Indicate all bond dipoles on your pictures.



Which molecule(s) are polar?

3. The species NO_2 , NO_2^+ , and NO_2^- have different bond angles. Arrange the three compounds in order of decreasing bond angle. Drawing the Lewis structures will help.

4. Draw an MO diagram of the cyanide anion. What is the bond order of the CN bond? Is the cyanide anion paramagnetic or diamagnetic?