

resonance structures which describe the predominant contributions to the bonding.  
Which statement is incorrect about this set of resonance structures?  
Each resonance structure possesses two localized N=O double bonds

[CHM307] Appropriate hybridization schemes for the C atoms in molecular  $\text{CH}_3\text{CO}_2\text{H}$  are  $\text{sp}^3$  and  $\text{sp}^2$

[CHM307] In the equation for the normalized wavefunction:  $\psi = N(\psi_{2s} + \frac{1}{\sqrt{2}}\psi_{2p})$ , N

[CHM307] An MO diagram for a model compound  $\text{XH}_6$  (Oh) can be constructed by considering the interactions between the orbitals of atom X and the LGOs for the  $\text{H}_6$  fragment. What are the correct symmetry labels for these LGOs?  $a_{1g}$ ,  $t_{2g}$ ,  $e_g$

[CHM307] Which statement is true about the bonding in  $\text{B}_2\text{H}_6$ ?  
Bonding pictures for  $\text{B}_2\text{H}_6$  involve multicentre bridge bonds

[CHM307] The bonding in  $\text{XH}_3$  can be considered in terms of the interactions between the orbitals of atom X and the LGOs of the  $\text{H}_3$  fragment. For the LGOs, when X = B, the in-phase combination of H 1s orbitals has  $a_1'$  symmetry, but when X = N, it has  $a_1$  symmetry. This is because:  $\text{NH}_3$  has  $C_{3v}$  symmetry, but  $\text{BH}_3$  belongs to the  $D_{3h}$  point group

[CHM307] In monomeric  $\text{BH}_3$ , let an axis definition place the molecule in the xz plane. Which atomic orbital on B is non-bonding?  $2p_y$

[CHM307]  $\text{sp}$  hybridization for the C atom in  $\text{CS}_2$  is all that is required to allow for the formation of the  $\sigma$  components of two double bonds

[CHM307] In an MO diagram for the formation of  $\text{H}_2\text{O}$  in which the z axis bisects the  $\text{HOH}$  angle, what happens? the O  $2p_z$  atomic orbital interacts with an out-of-phase combination of H 1s atomic orbitals

[CHM307]  $\text{sp}^3$  hybridization would not be appropriate for the central atom in  $\text{XeF}_4$

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