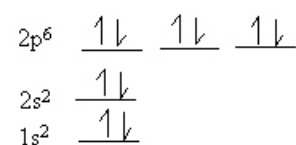
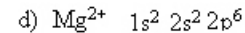
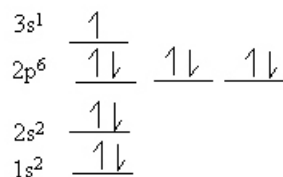
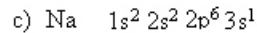
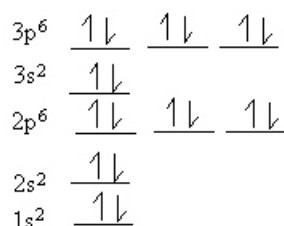
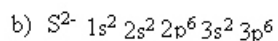
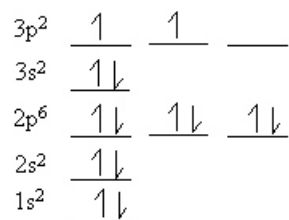
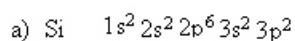
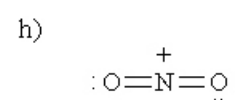
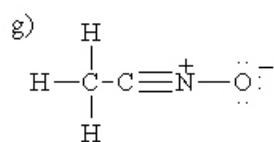
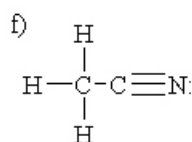
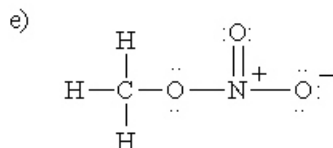
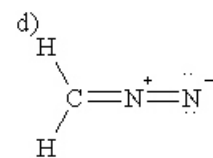
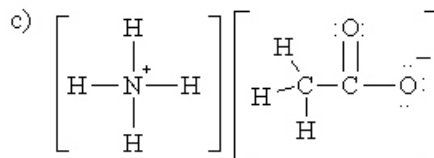
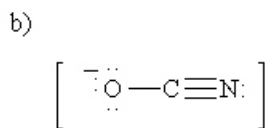
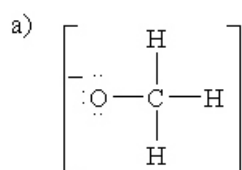


1. Give the ground-state electronic configuration for each of the following atoms or ions. Use individual orbital populations showing electron spin.



2. Draw a proper Lewis structure for each of the following, including all formal charges. Use only octet structures where possible. When more than one form is possible, choose the best (most stable) form.



{be sure to maintain the presented bonding arrangement}

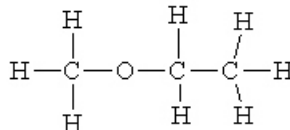
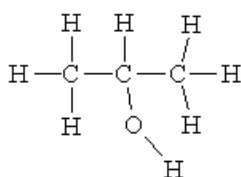
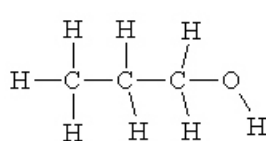
3. a) What is the hybridization of each non-hydrogen atom in 2a, 2c and 2g ?
 2a) O, C – sp^3 (109.5°) 2c) N – sp^3 CH_3 – sp^3 (109.5°) $\text{C}(\text{O}_2)$ – sp^2 (120°) O – sp^2
 2g) CH_3 – sp^3 (109.5°) C – sp (180°) N – sp (180°) O – sp^3 (109.5°)
 b) What are the bond angles about each C and N in 2a and 2c and 2g? (See above)

4. Draw the two most reasonable resonance forms for the anion in 2b. Pick the one that would contribute most to the resonance hybrid and explain your choice.

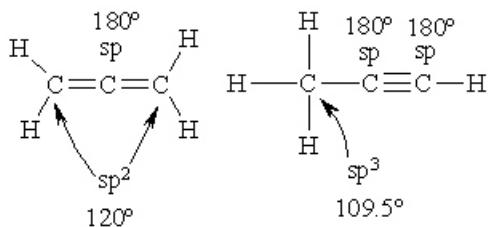


Structure B will contribute more since the more electronegative atom (O vs N) carries the negative charge.

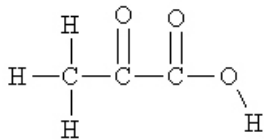
5. Draw line-bond structural formulas for all the constitutional isomers with the formula $\text{C}_3\text{H}_8\text{O}$.



6. Draw line-bond formulas for the two isomers (non-cyclic) of C_3H_4 . What are the hybridization and bond angles about each carbon in these two structures?



7. Pyruvic acid is an intermediate in metabolism ($C_3H_4O_3$). It's structure has a CH_3 group and two $C=O$ groups. Draw the line-bond formula for this compound.



8. Which of the following formulas represent unstable/improbable species? Explain

- a) C_2H_7 Improbable as Carbon would need 5 bonds, or hydrogen 2 bonds.
 b) C_2H_4Cl Unstable as carbon would have a vacant valence
 c) C_3H_8N Unstable as C or N would have to have an odd valence. Formula requires odd # H
 d) C_3H_4ClN Yes this is possible

9. Draw the line-bond formula for the following bond-line structure.

