1. Propose reasonable Lewis-dot structures for the following. There may be more than one correct answer.

   a) \( \text{H}_2\text{CO}_\text{H} \)

   b) \( \text{H}_2\text{NO}_\text{OH} \)

   c) \( \text{O}_\text{O} = \text{N} = \text{O} \)

   d) \( \text{H}_2\text{NO}_\text{H} \)

   e) \( \text{H}_2\text{C}_{\text{sp}^3} = \text{H}_2\text{Cl} \)

   f) \( \text{H}_2\text{C}_{\text{sp}^3} = \text{H}_2\text{H} \)

2. Identify the hybridization of each atom other than H and Cl in the compounds above. See above.

3. \( \text{O} = \text{N} = \text{O} \)

   - 16 e\(^{-}\)
   - localized charge

   \( \text{O} = \text{N} = \text{O} \)

   - 18 e\(^{-}\)
   - delocalized charge

   - two resonance structures describe the molecule

4. Propose a structure of a hydrocarbon with 4 carbons that has 2 sp\(^2\) – sp \(\sigma\) bonds.

   \[ \text{H}_2\text{C} = \text{C} = \text{C} \text{CH}_3 \]

5. Draw an orbital depiction of acrylonitrile. Label all bonds (\(\pi\) or \(\sigma\)) and orbitals (e.g. sp\(^3\)).
6. Determine the molecular formula of the following compounds:

a) \( \text{NH}_2 \)

b) \( \text{C}_8\text{H}_{11}\text{N} \)

c) \( \text{C}_8\text{H}_{16} \)

d) \( (\text{CH}_3)_2\text{CHCH}_2\text{CH(CH}_3)\text{CH}_2\text{C(CH}_3)_3 \)

\( \text{C}_{13}\text{H}_{24} \)

draw this compound in zig-zag form