1. Indicate if the following molecules are aromatic.

These electrons are orthogonal to the aromatic system.

These electrons are in the aromatic system.

Even though we have 10 pi electrons, severe steric interactions between the internal hydrogens prevent this molecule from achieving planarity.

\[ \text{NOT Aromatic} \]

2. Azulene has an unusually large dipole for an organic hydrocarbon. Explain why.

For azulene, we can draw numerous resonance forms in which both ends of the molecule are aromatic (cyclopentadienyl anion on the left; tropylium cation on the right). Delocalized aromatic molecules of this type are often depicted by drawing a circle with the charge in the center (see above).

3. Propose a synthesis starting from benzene, naphthalene, and any other materials.

4. Propose a mechanism.
1. Provide a mechanism

![Mechanism 1](image1)

2. Provide a mechanism

![Mechanism 2](image2)

3. Provide multistep syntheses starting from benzene and any materials containing 4 carbons or less

![Syntheses](image3)