You may work in groups up to 3 students. However, each student must make contributions to the answers.

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Question #1 (10 pts.)

Draw the structures for the following compounds:

a) Naphthalene

b) Anthracene

c) Pyridine

d) Cyclooctatetraene

e) Phenol
Question #2 (10 pts.)

Give the common name (not IUPAC) for the following compounds:

a)

b)

c)

d)

e)
Question #3 (10 pts.)

a) List the 4 requirements for aromaticity

b) Determine if the compounds shown below are aromatic:
Question #4 (10 pts.)

Furan is an aromatic compound. Show 3 resonance structures using curved arrows of furan.

\[ \text{Diagram of Furan} \]
Question #5 (10 pts)

Using resonance structures, show where electrophilic aromatic substitution (E+) will take place.

a)

b)
Question #6 (20 pts.)

Suggest a synthetic pathway for the formation of the following compounds starting with benzene:

A)  

B)
Question #7 (10 pts.)

Give the major product of the following reactions:

1. \( \text{C}_6\text{H}_6 + \text{HNO}_3 \xrightarrow{\text{H}_2\text{SO}_4} \)
2. \( \text{C}_6\text{H}_6 + \text{Br}_2 \xrightarrow{\text{Fe}} \)
3. \( \text{C}_6\text{H}_6 + \text{CH}_3\text{CCl}_3 \xrightarrow{\text{AlCl}_3} \)
4. \( \text{C}_6\text{H}_6 + \text{OH}^- \)
5. \( \text{C}_6\text{H}_6 + \text{H}_2\text{SO}_4 \)
Question #8 (20 pts.)

Review Question:

a) Give the hybridization of each carbon atom in the following compounds (9):

\[
\begin{align*}
\text{CH}_2\text{CHCH}_2\text{COCH}_2\text{CN} & \quad \text{CH}_3 \\
\text{CH}_3 & \\
\end{align*}
\]

b) Determine the indicated bond angle (4)

\[
\begin{align*}
\text{C} & \quad \text{C} & \quad \text{C} \\
\text{C} & \quad \text{C} \\
\end{align*}
\]

\[
\begin{align*}
\text{C} & \quad \text{C} & \quad \text{C} \\
\text{C} & \quad \text{C} \\
\end{align*}
\]

c) Give the Lewis Dot structures for the following compounds (4):

\[
\begin{align*}
\text{NH}_3 & \\
\text{HCN} & \\
\end{align*}
\]

d) Determine if the following compounds are Lewis Acids or Bases (3):

\[
\begin{align*}
\text{I} & \\
\text{CO}_2 & \\
\text{CH}_3\text{OH} & \\
\end{align*}
\]