Cyclic Hydrocarbons and Aromatics

Cyclic Hydrocarbons

- These are hydrocarbon chains that form rings and can be alkanes, alkenes, and alkynes
- Rare and usually unstable

IUPAC Names

Examples:
3 C = cyclopropene C_3H_6
4 C = cyclobutane C_4H_8

- The general formula for the series is

$$C_2H_{2n}$$

Naming Cyclic Hydrocarbons

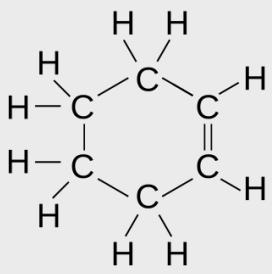
1) Identify the base number of carbons.
- If the ring has fewer carbons then the straight chain then the chain is the base.
- If the ring has more carbons then the straight chain then the ring is the base.

2) Use the appropriate IUPAC prefix with the ending 'ane', 'ene', or 'yne' depending on the saturation.
- If the ring is the base, the word '**cyclo**' will precede the number of carbons in the base.

3) Name any additional side chains as you would in a hydrocarbon.
- If the straight chain is the base, the word '**cyclo**' will precede the number of carbons in the side chain.

*Since hydrocarbons are circular, the location of the double or triple bond doesn't matter and assumed to be carbon 1.

Example:



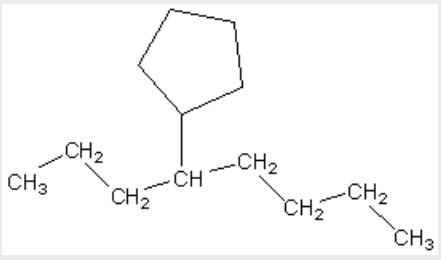
Answer: cyclohexene

Drawing Cyclic Hydrocarbons

1) Start by drawing the base chain. Draw the number of carbons as indicated by the prefix.
2) Add any indicated double or triple bonds.
3) Add any indicated side chains.
4) Saturate the remaining carbons.

Example: 4-cyclopentyloctane

Answer:

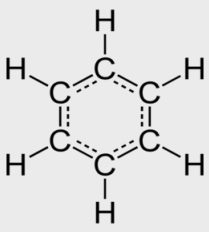


Aromatics

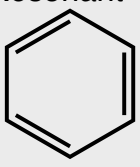
- Cyclic compounds containing benzene rings or derivatives
- Tend to be stable because benzene is a resonance structure in which six bonding electrons are shared equally.

Benzene

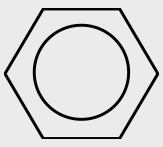
Structural



Resonant



Hybrid



$$C_6H_6$$

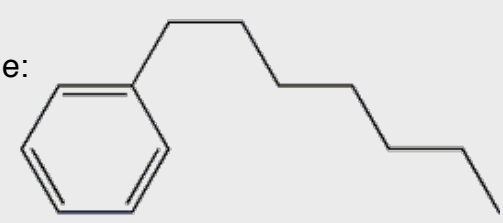
Naming Aromatic

1) Identify the base number of carbons.
- If the straight chain has six or fewer carbons the root is benzene
- If the straight chain has more then six carbons benzene is a sidechain and **phenyl** is used

2) Use the appropriate IUPAC prefix with the ending 'ane', 'ene', or 'yne' depending on the saturation if more then six carbons,
- Use the term **benzene** if less then six carbon chain

3) Name any additional side chains as you would in a hydrocarbon. Use numbers to dictate location.
- If the straight chain is the base, the word '**phenyl**' will need to be located using a number.

Example:



Answer: 1-phenylheptane

Drawing Aromatic

1) Start by drawing the base chain. Draw the number of carbons as indicated by the prefix.
*Use the resonance structure if benzene is the base
2) Add any indicated side chains.

Example: 1,3-dimethylbenzene

Answer: