2. Draw the isomers of dichlorocyclobutane. Show all stereoisomers as well as constitutional (structural) isomers. Label the isomers as chiral or achiral. Circle any meso compounds.

2.5. For the tricyclic compound shown, circle the equatorial methyl groups. Label the hydrogens at the ring fusions as axial (a) or equatorial (e).

1.5. For each of the following acid-base reactions state where the equilibrium lies? On the right or on the left?

1. (a) \[ \text{C-} + \text{O} \quad \text{left} \quad \text{C-} + \text{O} \]

0.5. (b) \[ \text{H-} + \text{N} \quad \text{left} \quad \text{H-} + \text{O} \]

3. Draw the cis and trans isomers of 1,2-diethylcyclohexane in their most stable chair conformations. Draw in the hydrogens on your chairs at the carbons where the ethyl groups are attached. Label them as cis or trans. Circle the most stable isomer and determine the difference in energy in kJ/mol.

\[
\begin{align*}
\text{CH}_3\text{CH}_2 - \text{CH}_3\text{CH}_2 & \text{ (1,3 diaxial)} = 18.0 \text{ kJ/mol} \\
\text{CH}_3\text{CH}_2 - \text{CH}_2\text{CH}_3 & \text{ (gauche)} = 4.8 \text{ kJ/mol} \\
\text{CH}_3\text{CH}_2 - \text{H} & \text{ (1,3 diaxial)} = 4.6 \text{ kJ/mol}
\end{align*}
\]

Both have gauche cancel out
\[ \Delta G^\circ = 9.2 \text{ kJ/mol} \]

1. Draw a compound that one could use to react with a racemic amine in order to separate the mixture into the enantiomers.

chiral enantiomerically pure carboxylic acid