4.36 Provide a systematic name for each of the following compounds:

(a) 4-Ethyl-3-methylcyclohexane
(b) 5-sec-Butyl-4-ethyl-2-methylcyclohexane

(j) 2,3,5,9-Tetramethylbicyclo[4.4.0]decanone
(k) 1,4-Dimethylbicyclo[2.2.2]octane

4.40 Draw each of the following compounds:

(a) 2,2,4-Trimethylpentane
(b) 1,2,3,4-Tetramethylcycloheptane

4.53 Draw a Newman projection of the following compound as viewed from the angle indicated:
4.56 Rank the following conformations in order of increasing energy:

1: LEAST STABLE

Staggered

Gauche

Eclipsed

Eclipsed

Staggered

Antiperiplanar

3

1

2

4

4.43 Draw the ring flip for each of the following compounds:

(a) Cl

(b) Cl

(c) Cl

2)

3

2

1

CH₃

MORE STABLE

b)

3

2

1

CH₃

MORE STABLE

C)

4

5

6

OH

OH

H₃C

LES5 STABLE

5.37 Identify the number of stereoisomers expected for each of the following:

33 = 8

No Meso

(b)

2⁴ = 16

No Meso

(c)

2² = 4

BUT MESO:

(e) HO

Meso

2² - 1 = 3

\therefore 2² - 1 = 3_{(meso)}
5.45 For each of the following pairs of compounds, determine the relationship between the two compounds:

**Diastereomers**

(a) ![Diastereomer 1](image1)
(b) ![Diastereomer 2](image2)

**Enantiomers**

(c) ![Enantiomer 1](image3)
(d) ![Enantiomer 2](image4)

5.38 Draw the enantiomer for each of the following compounds:

(a) ![Enantiomer 1](image5)
(b) ![Enantiomer 2](image6)
(c) ![Enantiomer 3](image7)
5.39 Identify the configuration of each chiral center in the following compounds:

(e) 

(g) 

5.55 Identify whether each of the following compounds is chiral or achiral:

(a) **CHIRAL**

(b) **CHIRAL**

(c) **ACHIRAL (NO CENTERS)**

(e) **ACHIRAL (MESO)**
5.29 For each of the following alkenes, assign the configuration of the double bond as either E or Z:

(c) ![Configuration (c)](image)

(d) ![Configuration (d)](image)

Label each reaction diagram with product, reactant, transition state(s), and intermediate (if it exists). Show \( \Delta G \) and \( \Delta G^\ddagger \), then identify as exergonic/endergonic and spontaneous/non-spontaneous.
6.55 Which of the following can serve as a nucleophile?

(a) H\_\_CH\_\_H \quad (b) H\_\_N\^\_\_H \quad (c) H\_\_B\_\_H \quad (d) H\_\_O\_\_H

**NO** \quad **NO** \quad **NO** \quad **YES**

**ELECTROPHILES**

6.27 For each of the following reactions identify the arrow-pushing pattern that is being utilized:

(a) 
\[
\text{Cl} \quad \text{\(\rightarrow\)} \quad \text{Cl}^\text{-}
\]

LEAVING GROUP

(b) 
\[
\text{\(\rightarrow\)} \quad \text{\(\rightarrow\)}
\]

REARRANGEMENT (METHYL SHIFT)

(c) 
\[
\hspace{1cm}
\]

NUCLEOPHILIC ATTACK

(d) 
\[
\hspace{1cm}
\]

PROTON TRANSFER
6.37 Draw curved arrows for each step of the following mechanism:
Predict whether each of the following carbocations will rearrange. If so, draw the expected rearrangement using curved arrows.