1. The (+) enantiomer of a compound has a specific optical rotation of +23°. A solution contains 8.5g of the (+) enantiomer and 1.4g of the (-) enantiomer in 20ml of CCl₄, measured in a 2 dm cell. Calculate the ee% of the solution.

\[
\alpha = \frac{\text{specific rotation}}{C \times l} = \frac{+23°}{8.5 \text{g} \times \frac{20\text{mL}}{100\text{mL}}} = +16.33°
\]

\[
\text{ee%} = \frac{\text{observed } \alpha}{\text{specific } \alpha} \times 100 = \frac{16.33°}{23.00°} \times 100 = 71.87%
\]

2. For the following compound do the following

a. Draw the two chair conformations of the structure

b. Circle the most stable chair conformation and indicate the direction of the equilibrium
3. As shown, draw the Newman projection of the compound from the indicated point of view, left to right. Draw what the Newman projection with the highest energy eclipsed conformation looks like.

4. For each pair of the structures below, indicate whether they are enantiomers, diastereomers, constitutional isomers, or identical compounds. Hint: flatten chairs into cyclohexanes to better visualize the structure.
5. Answer the following questions based on the compounds below.

A  B  C  D

a. Which pairs are enantiomers?
A and B

b. Which pair of compounds are diastereomers?
A and C
B and C

c. Which pair of compounds can exist as racemic mixtures?
A and B

d. Which compound(s) have zero optical rotation?
C
D

6. Draw the 3-D dash-wedge structure for the following compound.

(3S,4R)-1-bromo-3-chloro-4-methylhexane

(S)-1-iodo-3-isopropylheptane
7. For the compound below, label all stereoisomers as R or S. Stereocenters are also called chiral centers.

![Chemical structure](image)

8. Of the two compounds, one has a higher boiling point. Determine the one with a higher boiling point and explain why.

\[
\begin{align*}
\text{CH}_3\text{CH}_2\text{CH}_2(\text{C}=\text{O})\text{NHCH}_3 & \quad \text{CH}_3\text{CH}_2\text{CH}_2(\text{C}=\text{O})\text{N(CH}_3)_2 \\
\end{align*}
\]

It helps to draw the structure of the condensed formula to visualize that the structure on the left cannot form hydrogen bonds with another molecule of itself. Knowing this, the aforementioned molecule has a weaker intermolecular force and a lower boiling point.