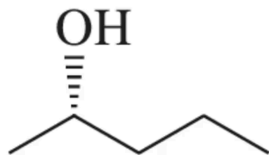


S_N1 and S_N2 Reactions: Stereochemistry Assignment

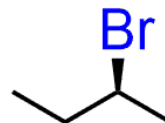
Name: _____ Date: _____

Assign the R or S configuration to each chiral center marked with an asterisk (*). Show your work by indicating priority rankings (1-4) for each substituent.

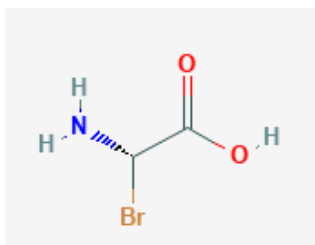
1.



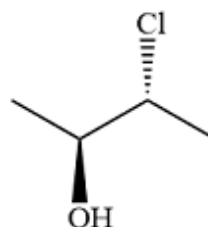
2.



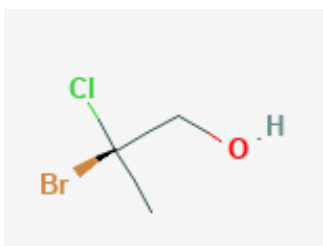
3.



4.



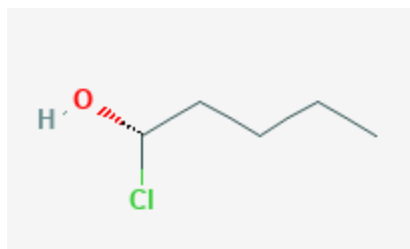
5.



For each compound below, draw its enantiomer. Use wedge-and-dash notation to show stereochemistry clearly.

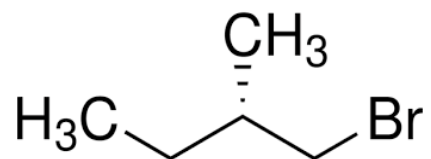
1. Given compound:

Draw the enantiomer:



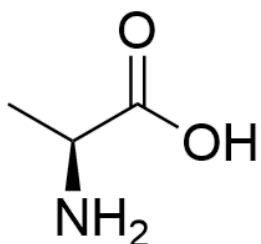
2. Given compound:

Draw the enantiomer:



3. Given compound:

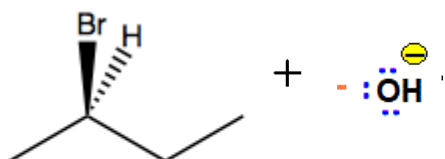
Draw the enantiomer:



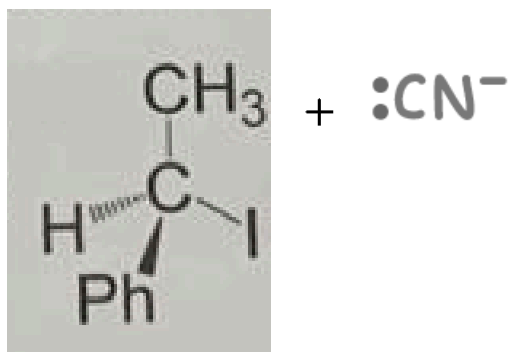
For each reaction below:

- Draw the complete mechanism using curved arrows
- Show the stereochemistry of the product
- Indicate whether inversion, retention, or racemization occurs
- Assign R/S configuration to both starting material and product

1. (10 marks)



2.

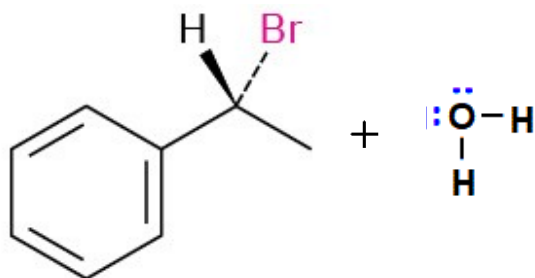


(Ph = phenyl group, C₆H₅)

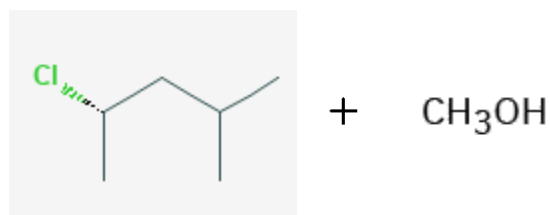
For each reaction below:

- Draw the complete mechanism showing the carbocation intermediate
- Draw both possible stereoisomeric products
- Explain the stereochemical outcome
- Assign R/S configuration to all products

1.



2.



For each scenario, predict whether the reaction will result in:

- $\text{S}_{\text{N}}1$ or $\text{S}_{\text{N}}2$ mechanism
- Stereochemical outcome (Inversion of configuration or racemization)
- Explain your reasoning for each answer.

1. A primary alkyl bromide undergoes substitution with hydroxide ion in a polar aprotic solvent.

Mechanism: _____

Stereochemical outcome: _____

Explanation:

2. A tertiary alkyl chloride undergoes substitution with water in a polar protic solvent.

Mechanism: _____

Stereochemical outcome: _____

Explanation:

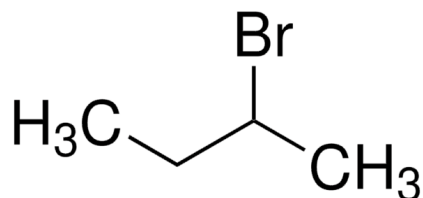
3. A secondary alkyl iodide undergoes substitution with cyanide ion in DMSO (polar aprotic solvent) at room temperature.

Mechanism: _____

Stereochemical outcome: _____

Explanation:

1. The following compound undergoes an S_N2 reaction with sodium azide (NaN_3). This compound has R configuration. Draw the mechanism and predict the stereochemistry of the product. Assign its R/S configuration.



2. Explain why the following reaction gives a racemic mixture even though the starting material is enantiomerically pure:

