3. Show the major product(s) for each of the following reactions, showing stereochemistry where appropriate. (4 points each)

\[ \text{Br-} + \text{CH}_3\text{OH} \rightarrow \text{Br-} + \text{CH}_3\text{OH} \]

\[ \text{NaOH}_{2}\text{CH}_3 \rightarrow \text{NaOH}_{2}\text{CH}_3 \]

\[ \text{NaCl} \rightarrow \text{NaCl} \]

4. The following reaction produces a mixture of products. Predict the major and minor products from this reaction, indicating stereochemistry. Provide a mechanism for the reaction, using arrows to show the flow of electrons for this reaction. Show every step! (16 points)

\[ \text{Br} \rightarrow \text{CH}_3\text{CO}_2\text{Na} \rightarrow \text{CH}_3\text{CO}_2\text{H} \]

5. Predict the product structure (including stereochemistry) and clearly show the transition state which explains the stereochemistry observed in the reaction between the compounds shown below. (8 points)

\[ \text{CN} \rightarrow \text{Br} \rightarrow \text{S-} \rightarrow \text{CN} \rightarrow \text{S-} \rightarrow \text{Br} \]

*Backside attack & inversion*