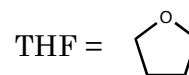


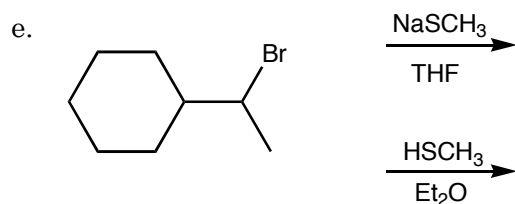
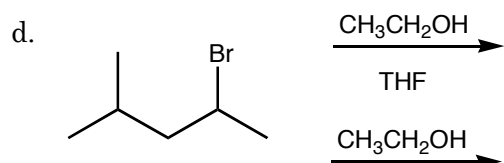
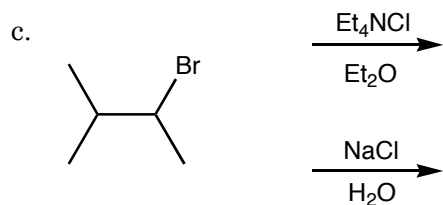
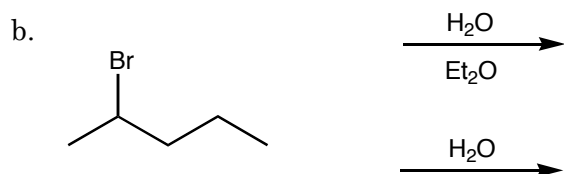
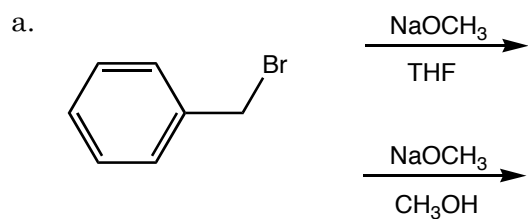
Remember,

$\text{Et}_2\text{O} = \text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$  or, in general,  $\text{Et} = \text{CH}_3\text{CH}_2$



xs = excess, and 1 equiv means 1 equivalent

1. Draw the product of the  $\text{S}_{\text{N}}2$  reaction (2 pts each), and choose the conditions that will favor an  $\text{S}_{\text{N}}2$  reaction (2 pts each).



2. Briefly respond to the following questions.

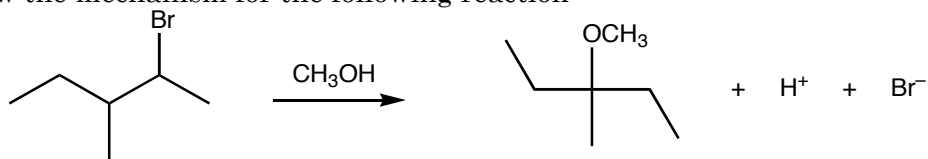
a. (6 pts.) A racemic mixture is expected when an  $S_N1$  reaction occurs at a chiral center, why?

b. (5 pts.) Occasionally, a racemic mixture does not result, why?

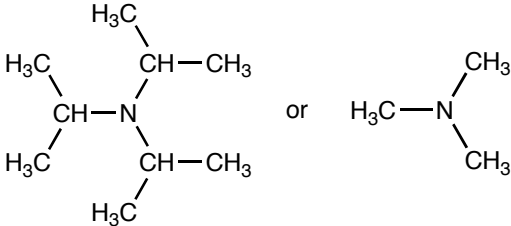
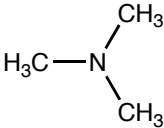
c. (5 pts.) Which solvent would promote racemization,  $H_2O$  or  $Et_2O$ , why?

3. (12 pts.) Draw the mechanism for the reaction of  $NaOCH_3$  with  $CH_3CH_2Br$ .

4. (12 pts.) Draw the mechanism for the following reaction



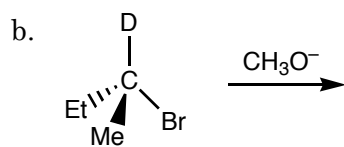
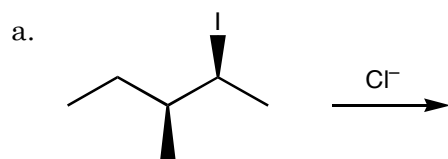
5. (2 pts. each) Assuming that the nucleophiles below are dissolved in diethyl ether (ethoxy ethane), for each pair of nucleophiles below, identify the better nucleophile.

- a.  or 
- b.  $\text{HOCH}_3$  or  $\text{HSCH}_3$
- c.  $(\text{CH}_3)_3\text{N}$  or  $(\text{CH}_3)_3\text{P}$
- d.  $\text{NaSCH}_3$  or  $\text{HSCH}_3$

6. (2 pts each) Assuming that the nucleophiles below are dissolved in isopropanol, for each pair of nucleophiles below, identify the better nucleophile.

- a.  $\text{HOH}$  or  $\text{NH}_3$
- b.  $\text{HOCH}_3$  or  $\text{HSCH}_3$
- c.  $(\text{CH}_3)_3\text{N}$  or  $(\text{CH}_3)_3\text{P}$
- d.  $\text{NaOH}$  or  $\text{NH}_3$

7. (7 pts each) Identify the product of the following  $\text{S}_{\text{N}}2$  reactions. Remember to specify the stereochemistry of the product.



8. (10 pts.) Determine the product of the following reaction that occurs by an  $\text{S}_{\text{N}}1$  reaction. Remember to consider the possibility of carbocation rearrangement.

