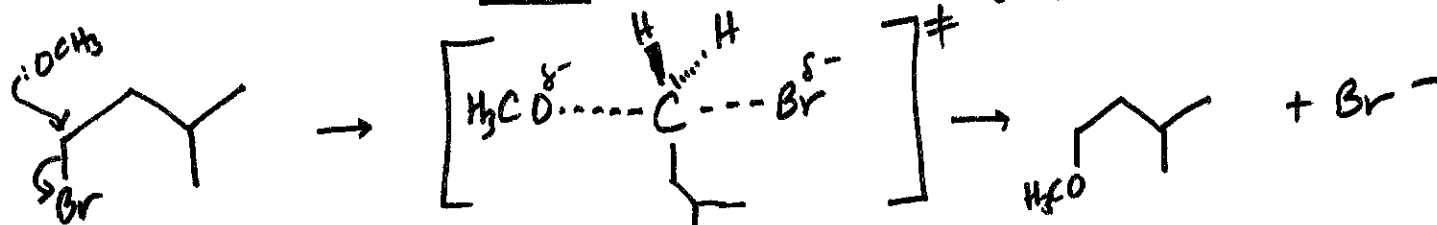


## S<sub>N</sub>1 & S<sub>N</sub>2 Practice

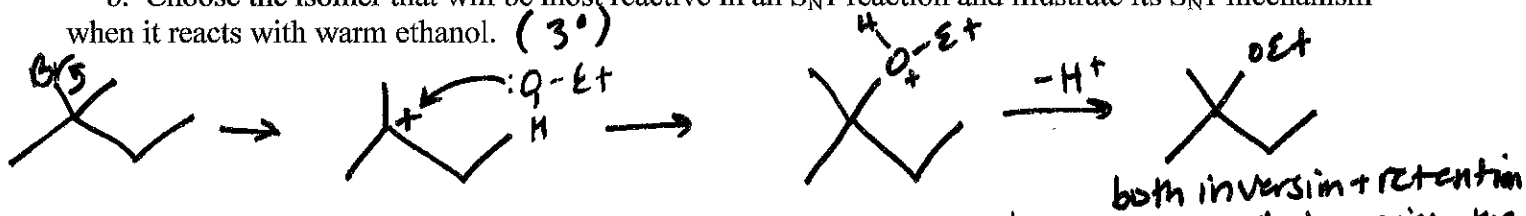
Chapter 11 – Reactions of Alkyl Halides

1. Considering the three constitutional isomers: 1-bromo-3-methylbutane, 2-bromo-3-methylbutane, and 2-bromo-2-methylbutane, please answer the following questions:

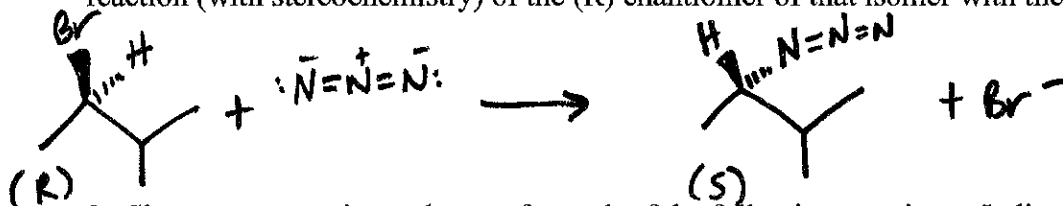
a. Choose the isomer that will be most reactive in an S<sub>N</sub>2 reaction and illustrate its S<sub>N</sub>2 mechanism when it reacts with sodium methoxide. Show the transition state. (10)



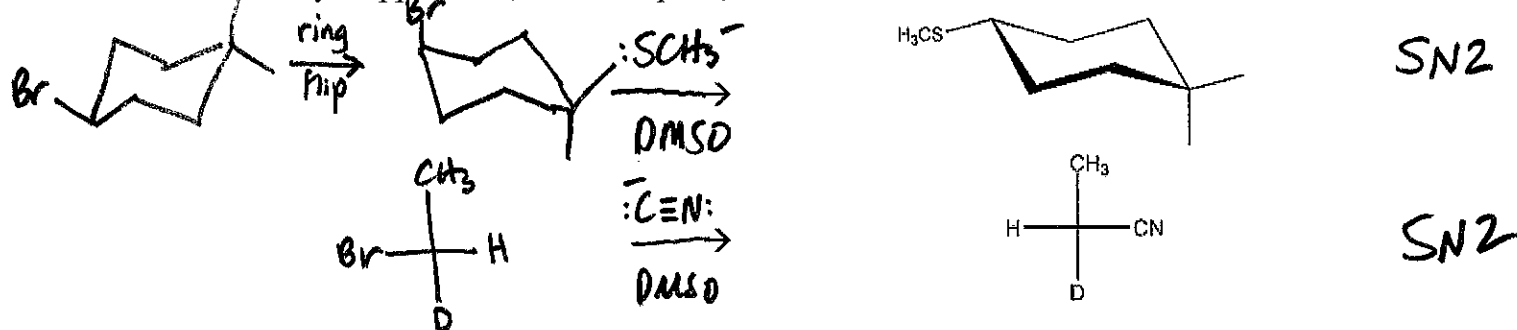
b. Choose the isomer that will be most reactive in an S<sub>N</sub>1 reaction and illustrate its S<sub>N</sub>1 mechanism when it reacts with warm ethanol. (3°)



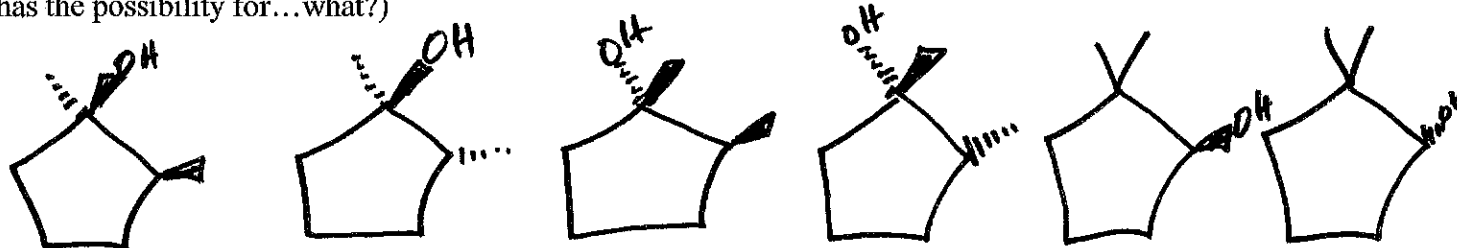
c. Select the only isomer that could be prepared in an optically active form and show the S<sub>N</sub>2 reaction (with stereochemistry) of the (R) enantiomer of that isomer with the azide anion (N<sub>3</sub><sup>-</sup>).



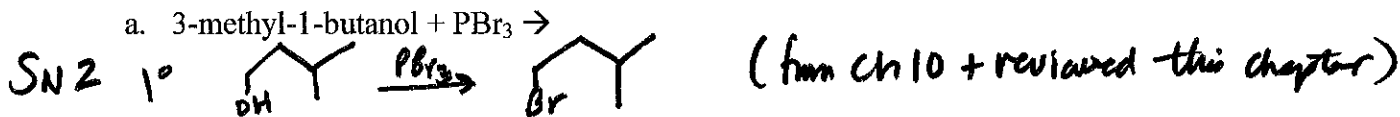
2. Show an appropriate substrate for each of the following reactions. Indicate the substrate with stereochemistry if appropriate, the nucleophile, and the solvent.



3. 2-bromo-1,1-dimethylcyclopentane is heated to form a carbocation intermediate. Show the six final products formed when this carbocation is treated with water. (Remember, a carbocation intermediate has the possibility for... what?)



4. Show the organic product(s) of the following substitution reactions. State whether it is an  $S_N1$  or an  $S_N2$  reaction if applicable. If there is no substitution reaction, please state so.



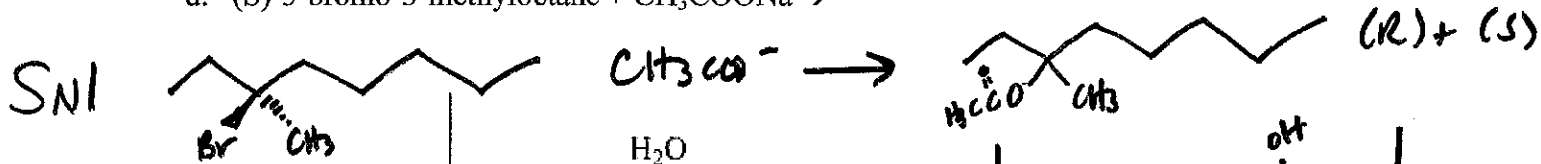
b. 1-bromo-3-methylbutane + trimethylamine  $((CH_3)_3N)$  in water  $\rightarrow$



c. bromocyclopentane + Mg then water  $\rightarrow$

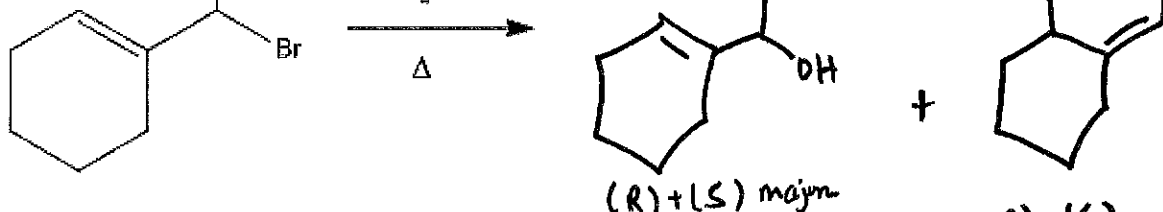


d. (S)-3-bromo-3-methyloctane +  $CH_3COONa \rightarrow$



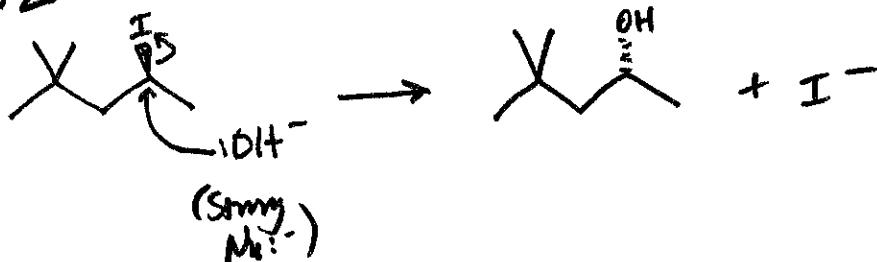
$S_N1$

e.



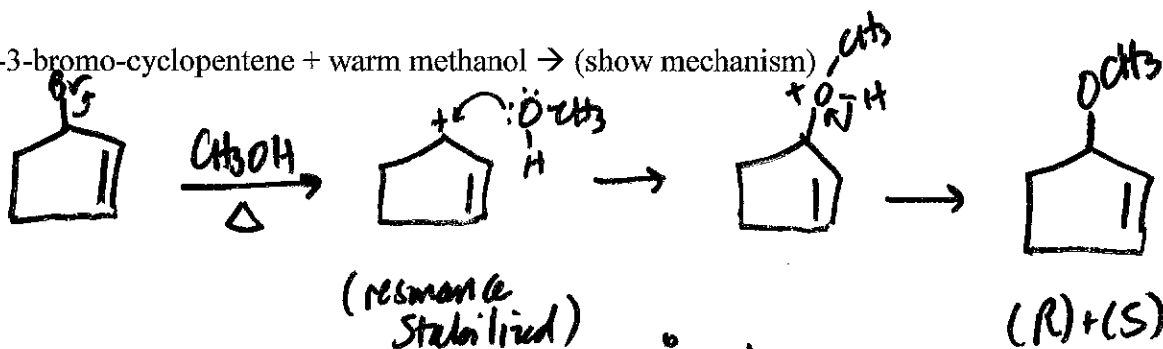
f. (S)-4-iodo-2,2-dimethylpentane +  $NaOH \rightarrow$  (show mechanism)

$S_N2$



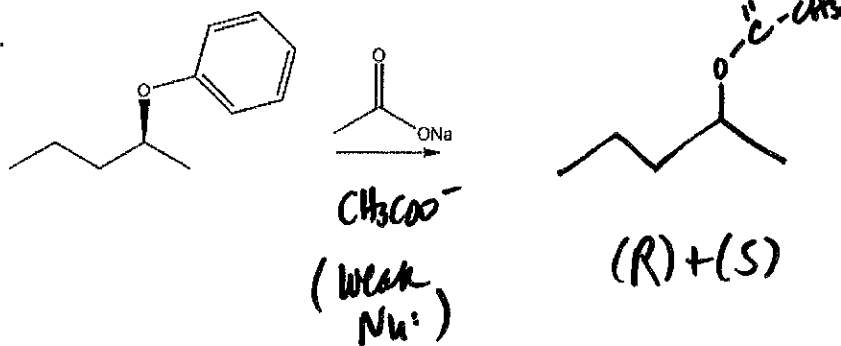
g. (S)-3-bromo-cyclopentene + warm methanol  $\rightarrow$  (show mechanism)

$S_N1$



h.

$S_N1$



(The LG in this case is not the best, even with the resonance stabilization, so this reaction may not occur)