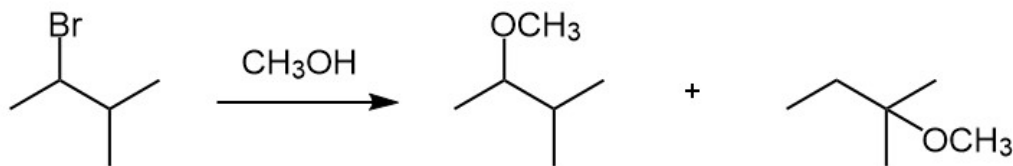
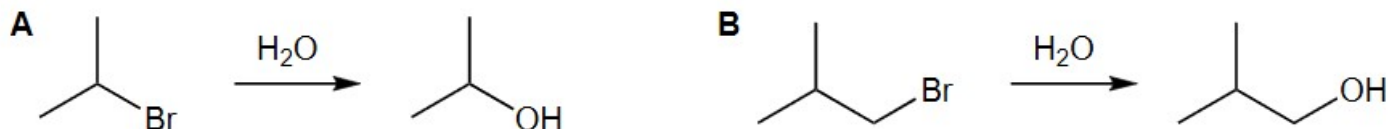




Provide a mechanism to account for both products formed.



Which would be the faster reaction (A or B)? Explain. (Consider first: $\text{S}_{\text{N}}2$ or $\text{S}_{\text{N}}1$ mechanism?)



Summary of Substitution Reactions

Alkyl Group	$\text{S}_{\text{N}}1$	$\text{S}_{\text{N}}2$
3° (tertiary)	common	rare (N/R)
2° (secondary)	sometimes	sometimes
1° (primary)	rare (N/R)	common
CH_3 (methyl)	never (N/R)	common
allyl/benzyl	common	common (if not 3°)

S_N2 vs. S_N1

a) S_N2

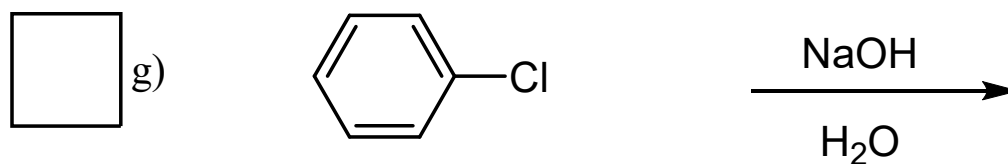
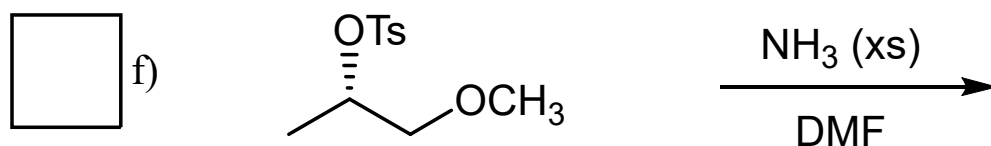
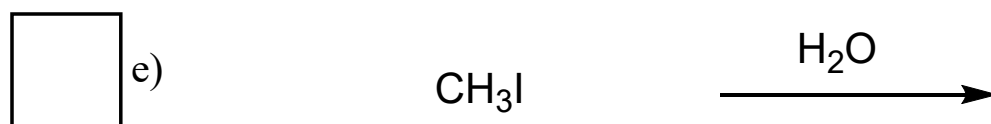
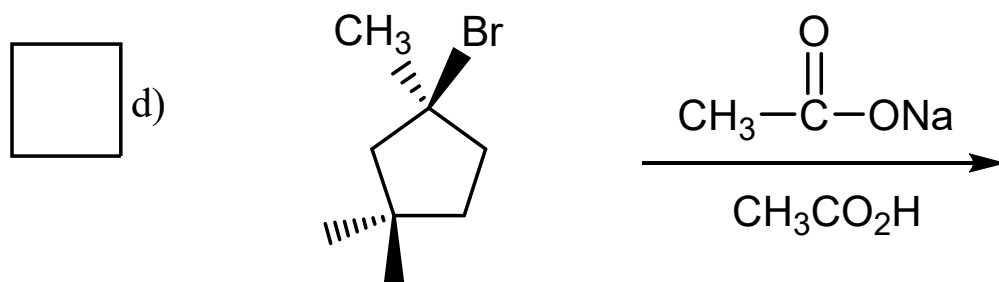
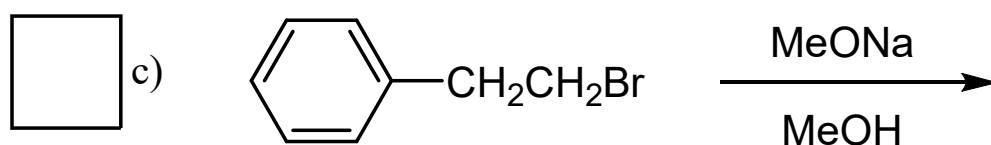
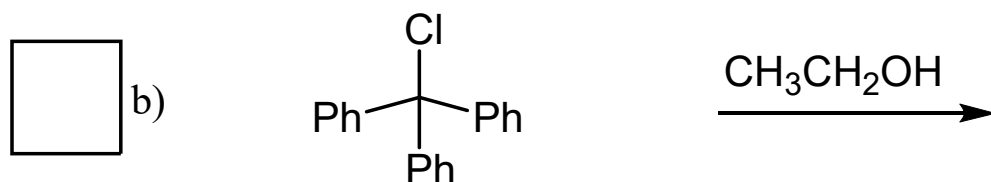
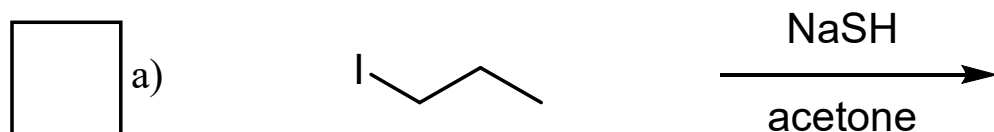
b) S_N1

c) N/R

S_N2 requires **strong Nu:** and **minimal steric hindrance**

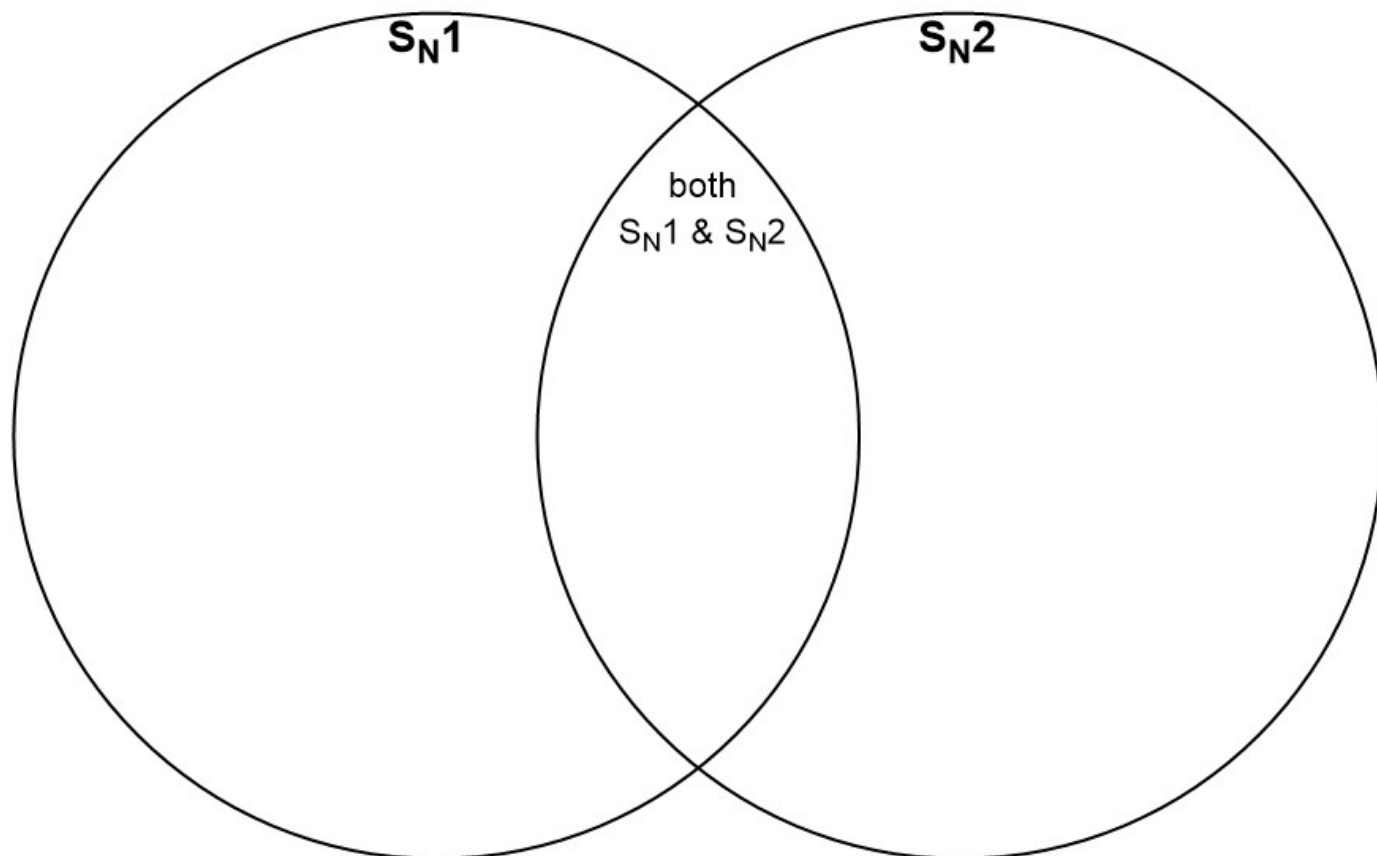
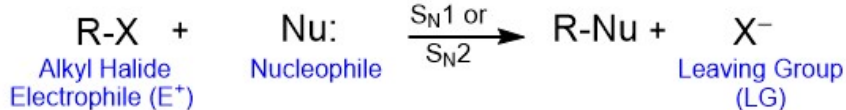
S_N1 requires a **stable carbocation** and typically involves a **weak Nu:**

In the box provided, indicate the mechanism involved in each of the following reactions (S_N1 or S_N2). If no reaction is expected, write NR. Predict the major product(s) expected, and remember to indicate stereochemistry, when appropriate.



Comparison of S_N1 and S_N2 Mechanisms

Consider a substitution reaction:



Categorize each of the following items as being related to S_N1, S_N2, or both.

carbocation	sterics	no reaction on vinyl RX	strong Nu:
bimolecular	aprotic solvent	HO ⁻ Nu:	Rate = $k[\text{RX}][\text{Nu:}]$
good LG	unimolecular	Rate = $k[\text{RX}]$	<i>t</i> -BuBr = fastest
MeOH Nu:	H ₂ O Nu:	weak Nu:	no reaction on 3° RX
backside attack	solvolysis	inversion of stereochemistry	rearrangement
a bond forms in rate-determining step	MeI = fastest	NaOMe Nu:	a bond breaks in rate-determining step
more than one transition state	no reaction on 1° RX	protic solvent	racemization
3° RX	unhindered E ⁺	2° RX	1° RX
	only one transition state		