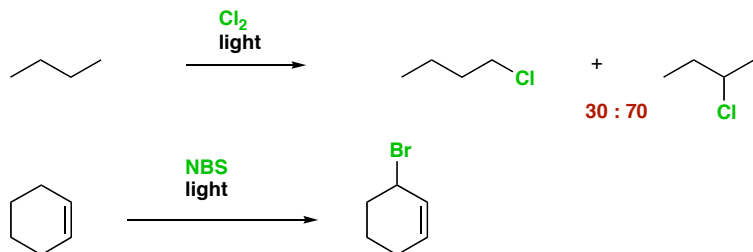
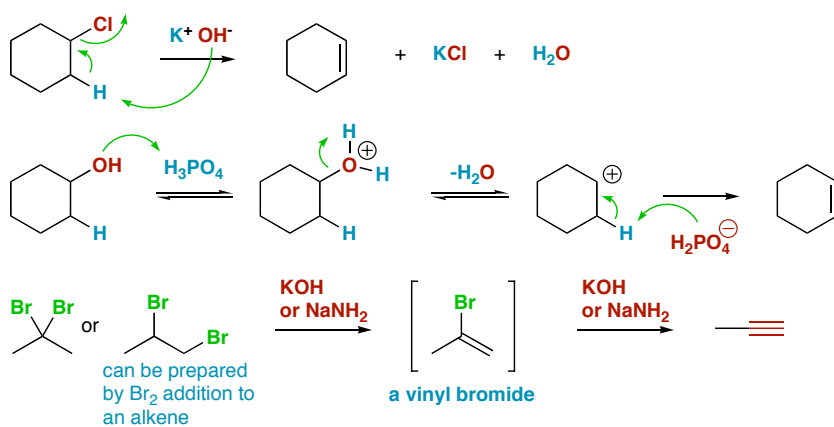


Free Radical Halogenation of Alkanes

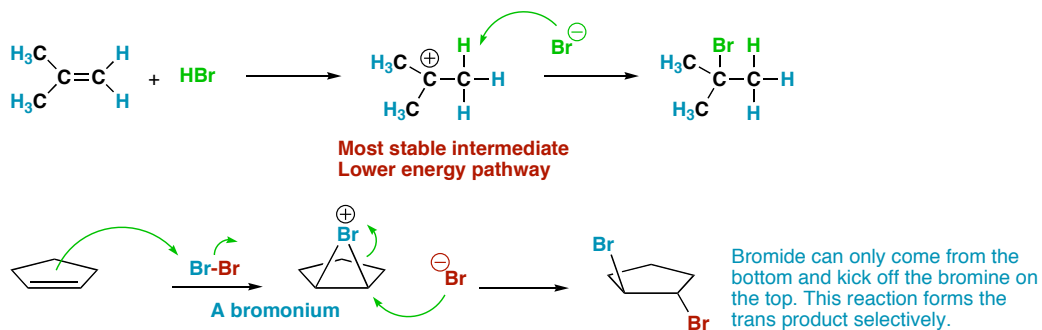


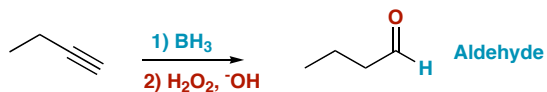
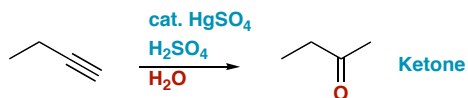
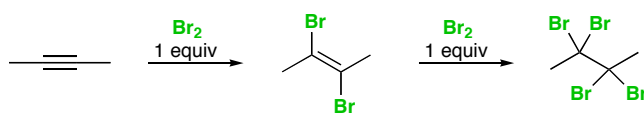
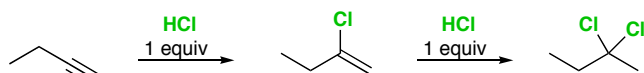
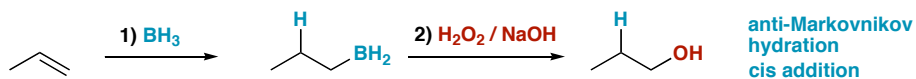
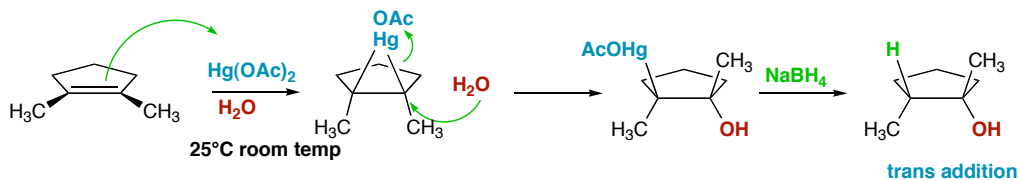
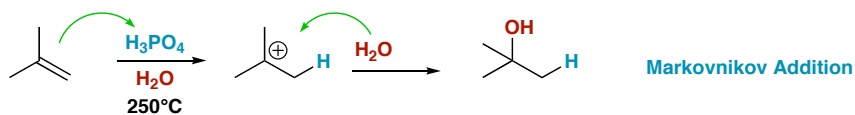
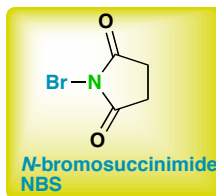
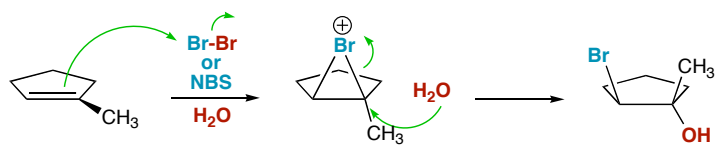
Elimination Reactions

Know details of E1 and E2 mechanisms (see summary at end)

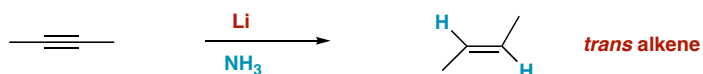
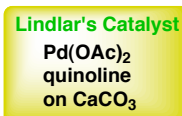
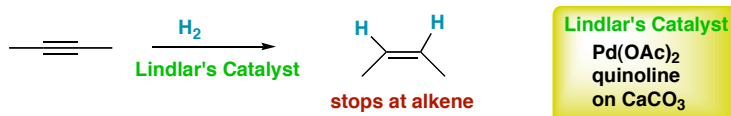
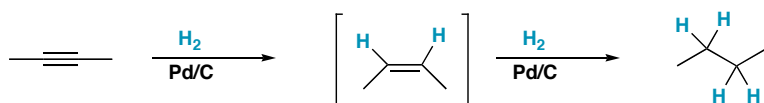
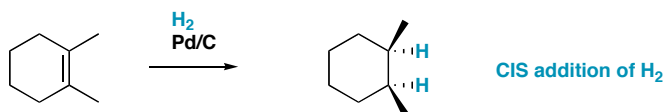


Electrophilic Addition Reactions

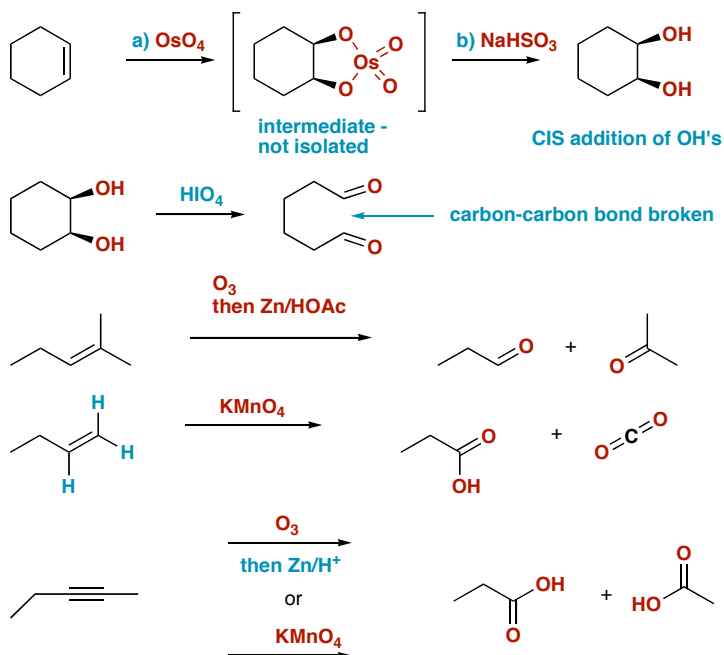




Reduction (Hydrogenation) Reactions

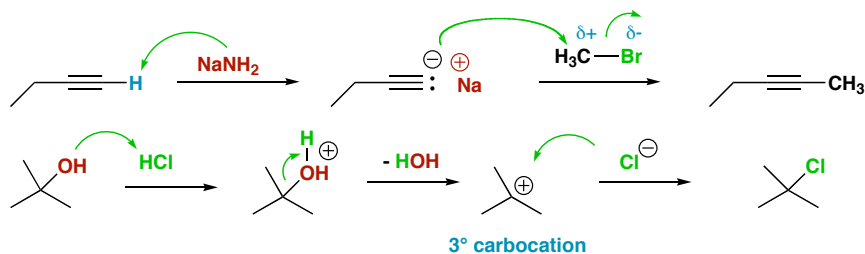


Oxidation Reactions

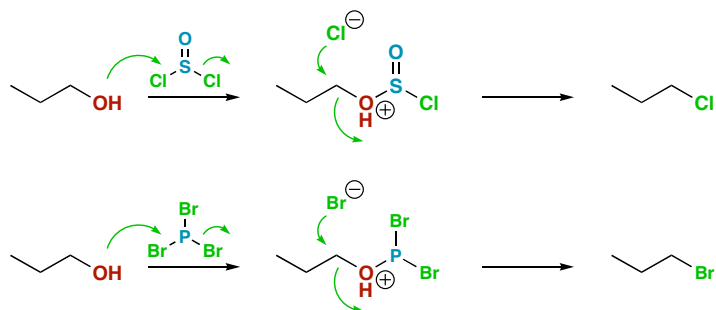


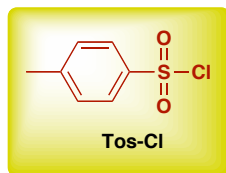
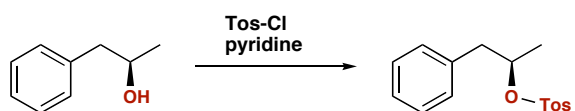
Substitution Reactions

In addition to these specific substitution reactions, you should be familiar with the details of the $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ reaction mechanisms. You should also know the different leaving groups (halides and tosylates) and different nucleophiles we have discussed in class. (See summary at end)

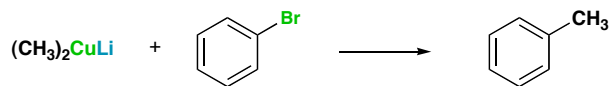
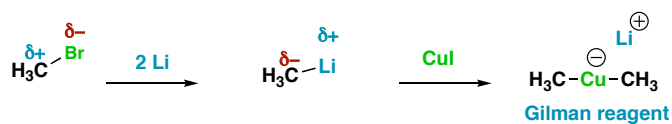
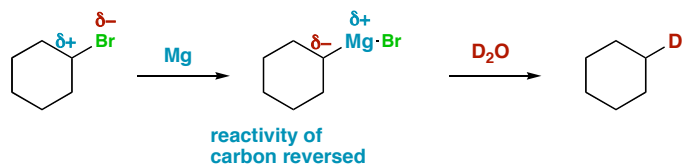


note: The following SOCl_2 and PBr_3 reactions will result in inversion of stereochemistry if it is present. They are $\text{S}_{\text{N}}2$ reactions.





Organometallic Reactions



Summary of Substitution and Elimination Reactions

R-X	S_N1	S_N2	E1	E2
1°	X	favored with good nucleophile	X	favored with strong base
2°	can occur best if allylic	can occur with good nucleophile	can occur best if allylic	favored with strong base
3°	favored competes with E1	X	favored if basic competes with S_N1	favored with strong base
Stereochem	racemic	100% inversion	doesn't matter	antiperiplanar required

Comparison of Substitutions

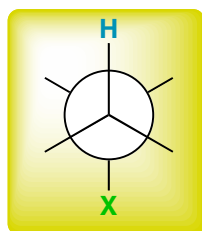
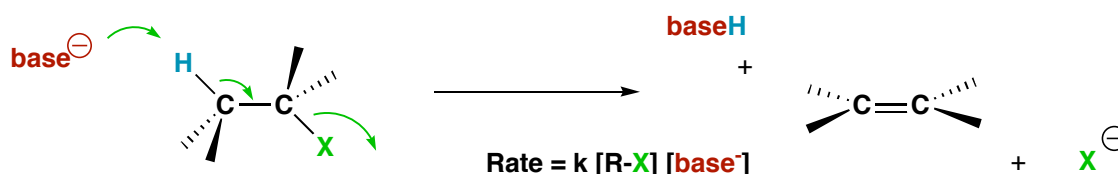
	S _N 1	S _N 2
SUBSTRATE	3° >> 2° > 1°	1° > 2° >> 3°
NUCLEOPHILE	Weak OK	Strong
LEAVING GROUP	Stable Anions	Stable Anions
SOLVENT	Polar Protic	Polar Aprotic
STEREOCHEM	Racemic	100% inversion

Nucleophile Comparisons

Note, good bases would be Alcoxides (⁻OR), Hydroxides (⁻OH) and amides (⁻NH₂).

NUCLEOPHILE	H ₂ O	NH ₃	Cl ⁻	HO ⁻	CH ₃ O ⁻	I ⁻	CN ⁻	HS ⁻
RELATIVE RATE FOR S _N 2	1	700	1000	16,000	25,000	100,000	125,000	125,000

E2 elimination geometry



Hydrogen and leaving group must be antiperiplanar for elimination to take place.