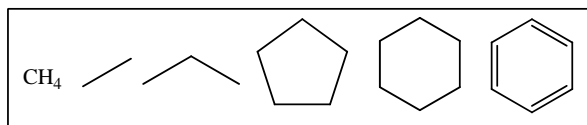
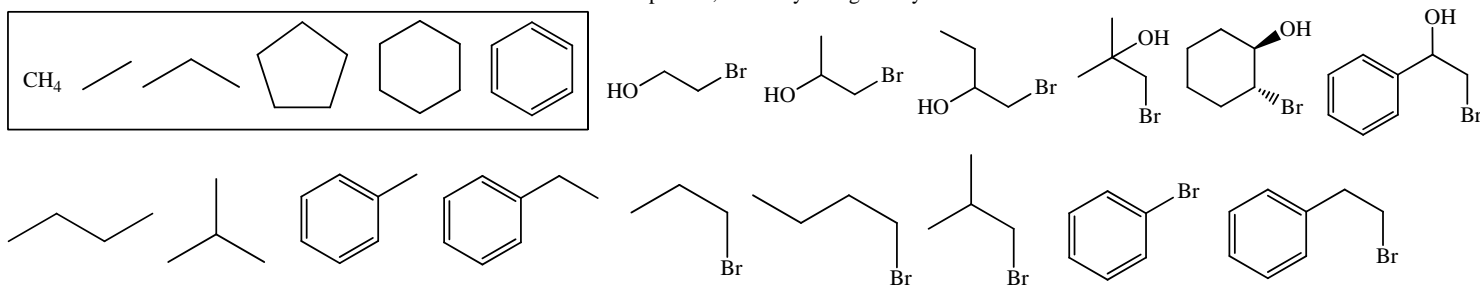


Available chemicals from the catalog (the starting sources of carbon compounds will continually decrease as we learn new reactions).

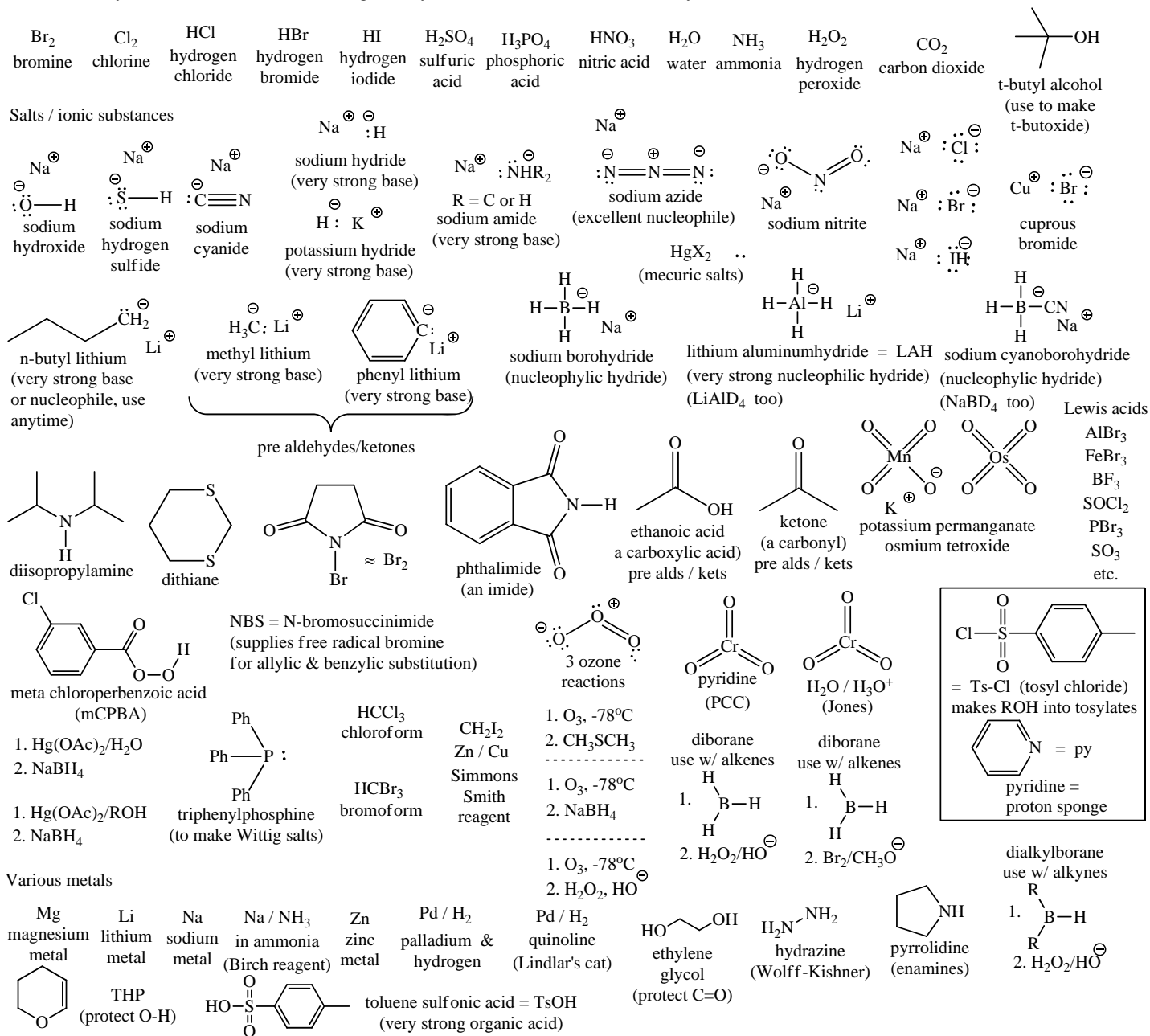
Sources of carbon - you can invoke these whenever needed:



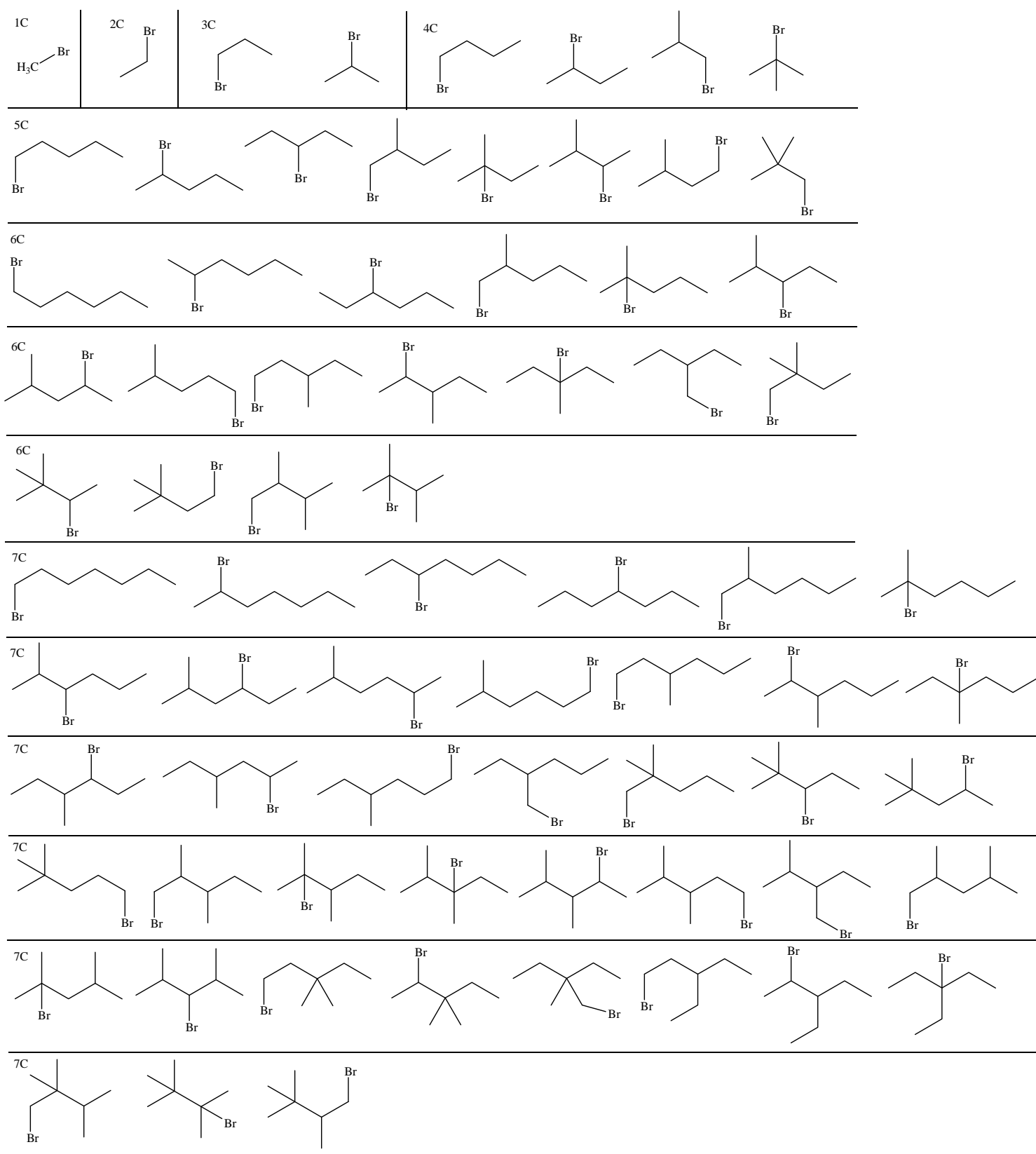
Sources of carbon - you can until we cover reactions that will make them from the above compounds, then they will go away:



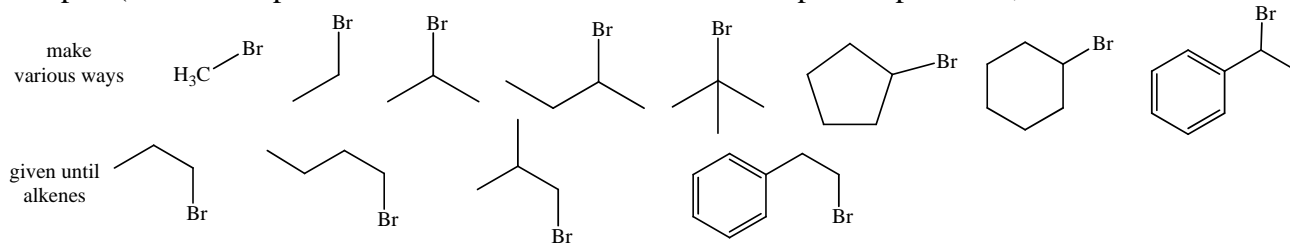
Commercially available chemicals and reagents - you can invoke these whenever you need them.



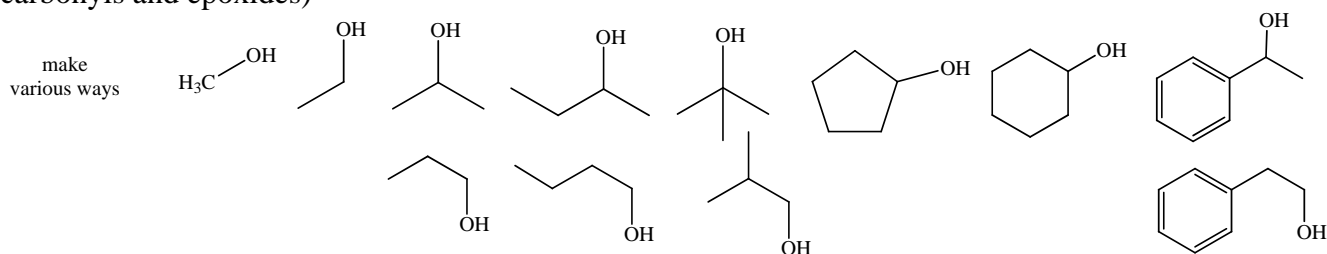
C1 through C7 R-Br examples (no stereochemistry indicated; enantiomers and diastereomers). Soon any of these will be within our grasp (...and more).



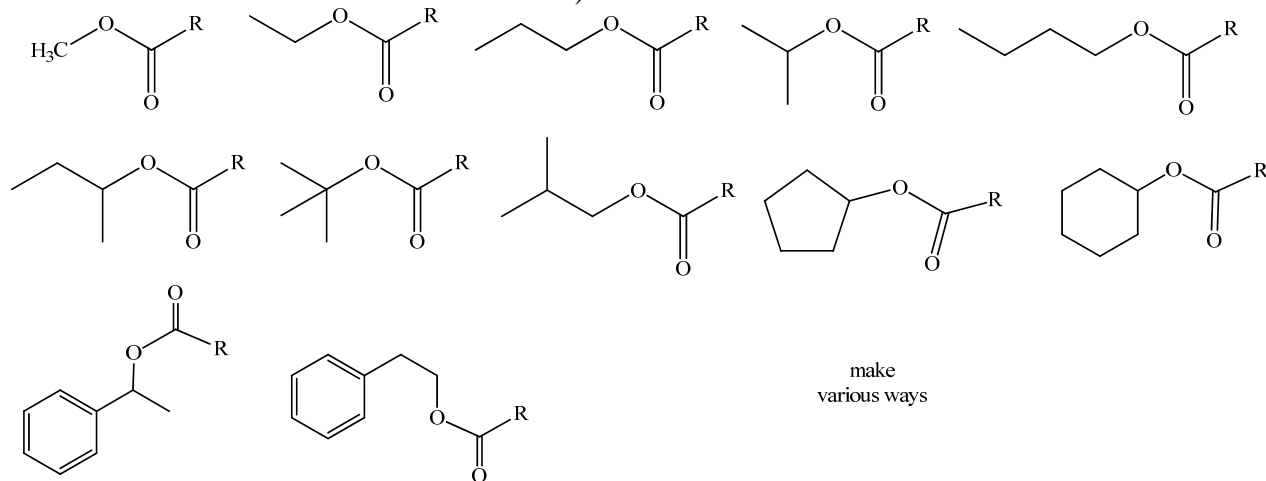
Group A (bromo compounds from free radical substitution at sp^3 C-H positions, from alcohols and alkenes)



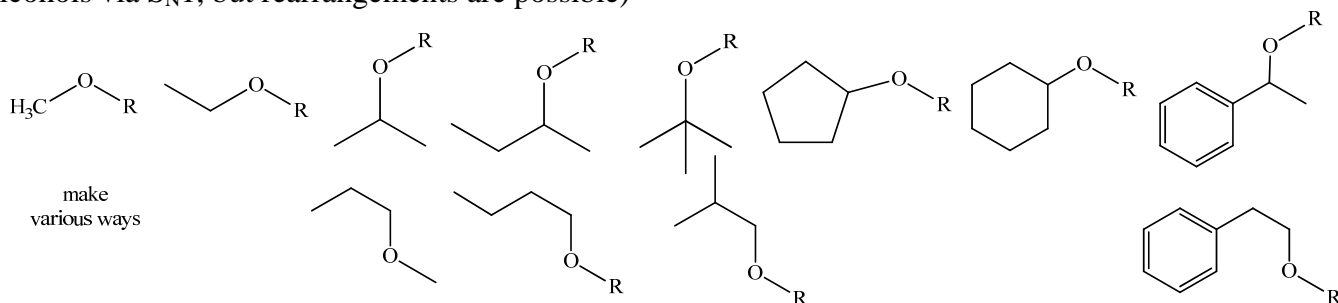
Group C (ROH from methyl and primary bromides and hydroxide via S_N2 reactions; ROH from secondary and tertiary bromides and water via S_N1 , but rearrangements are possible; also ROH from alkenes, carbonyls and epoxides)



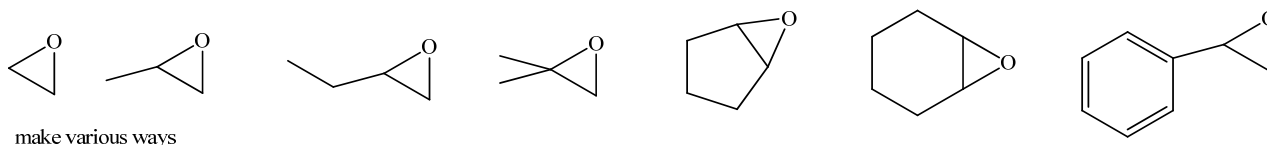
Group D (esters from methyl, primary and secondary bromides and carboxylates (acetate, here) via S_N2 reactions, esters can be hydrolyzed to alcohols via acyl substitution with hydroxide, and via S_N1 at tertiary RX and various other methods we will learn)



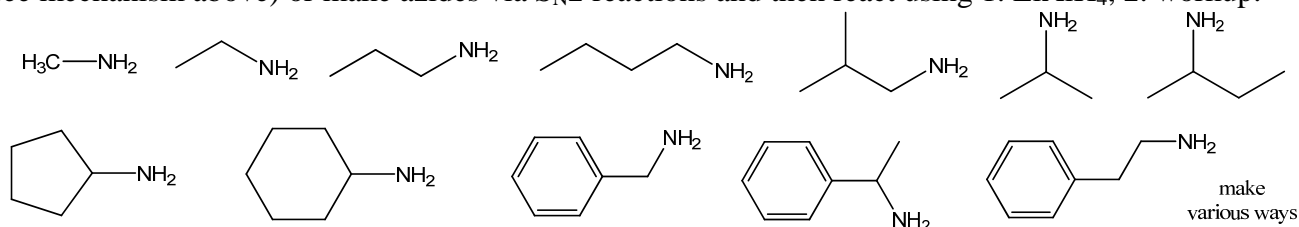
Group F (ethers from methyl and primary bromides and alkoxides via S_N2 reactions, t-butoxide reacts mostly by E2, 2° RX and 3° RX mainly form E2 products too) (ethers from secondary and tertiary bromides and alcohols via S_N1 , but rearrangements are possible)



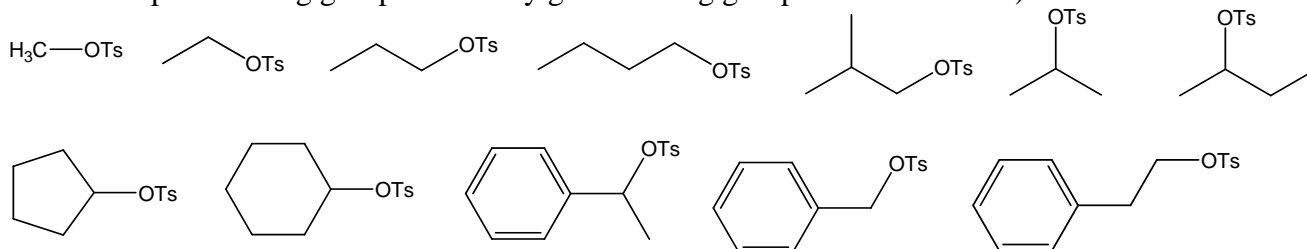
Epoxides are “special” ethers that can be made from bromohydrins + base or alkenes + mCPBA (later). The large ring strain allows them to be easily opened by strong nucleophile/bases or in strong acid.



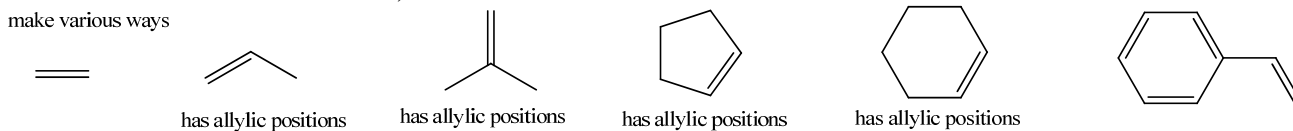
Group G (amines from methyl, primary and secondary bromides and conjugate base of phthalimide via S_N2 reactions, the alkyl imide can be hydrolyzed to primary amines via two acyl substitutions with hydroxide, see mechanism above) or make azides via S_N2 reactions and then react using 1. LiAlH_4 , 2. workup.



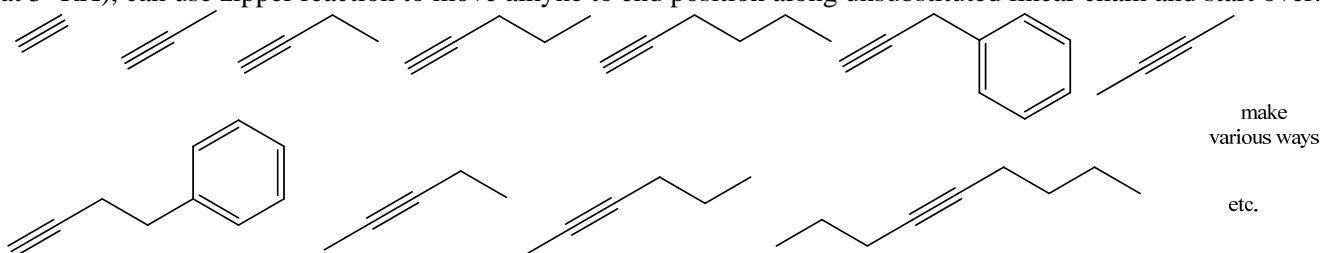
Group H (tosylates formed from alcohols and tosyl chloride/pyridine via acyl substitution reaction, converts “OH” from poor leaving group into a very good leaving group similar to iodide)



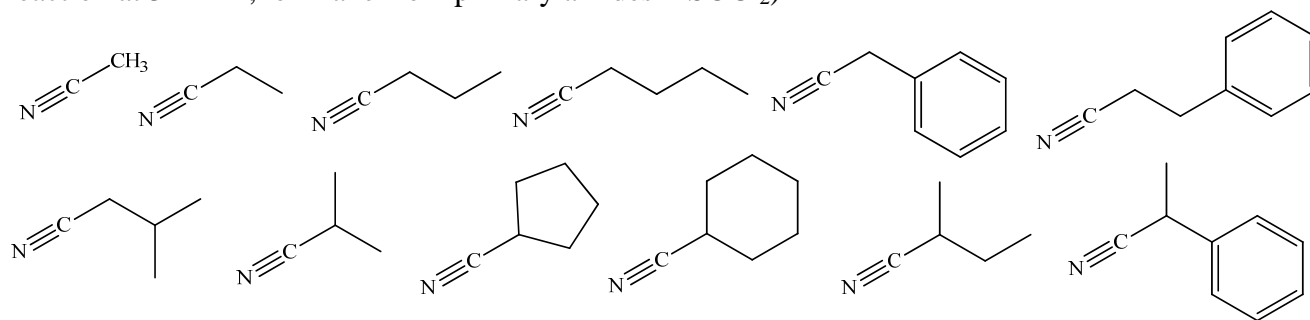
Group I (alkenes formed by E2 reaction with potassium t-butoxide and R-Br compounds or make via E1 reactions of ROH and $\text{H}_2\text{SO}_4/\Delta$)



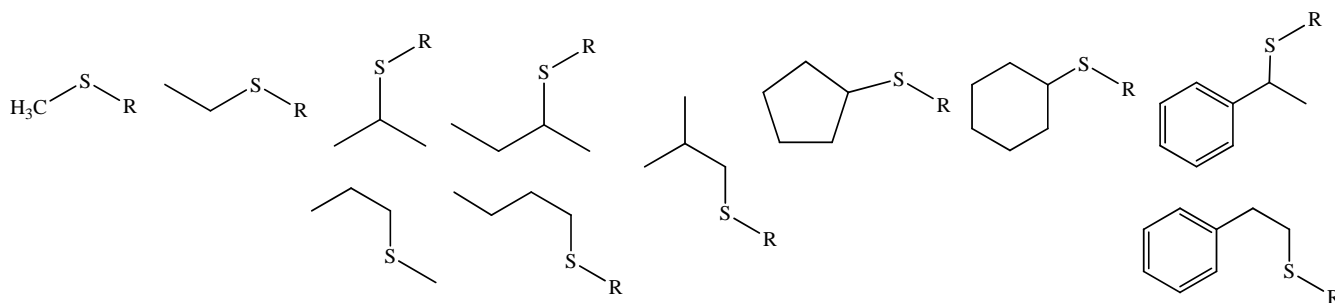
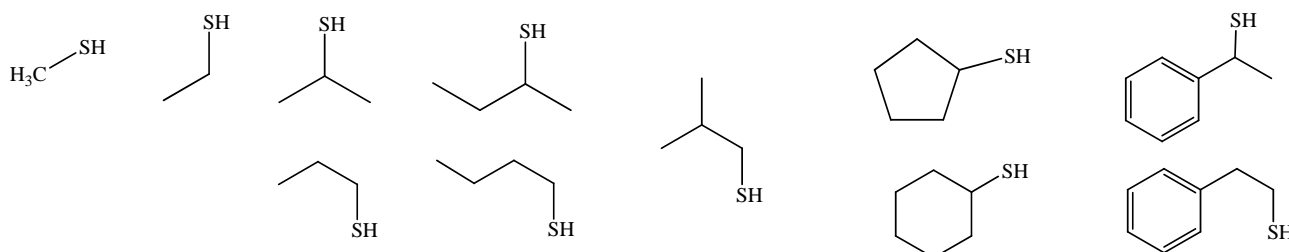
Group J (make ethyne or propyne using dibromo ethane or propane and double E2 reactions using NaNR_2), (make other alkynes from terminal acetylide and methyl or primary RX via S_N2 reaction; two reactions are possible in stepwise manner on both sides of ethyne, can put one or two “R” groups on, mostly E2 reaction at 2° R-Br and only E2 at 3° RX), can use zipper reaction to move alkyne to end position along unsubstituted linear chain and start over.



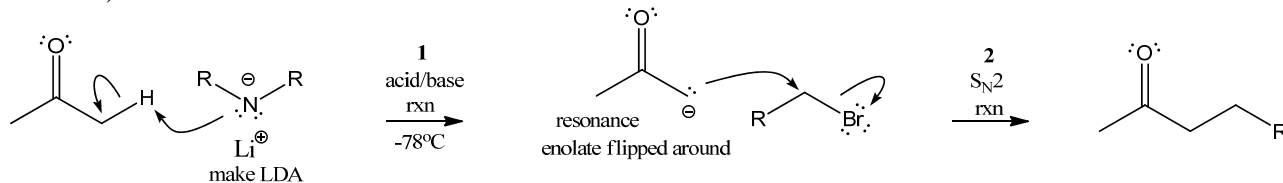
Group K (nitriles from cyanide and methyl, primary and secondary RX via S_N2 reaction, reaction, only E2 reaction at 3° R-Br; or make from primary amides + $SOCl_2$)



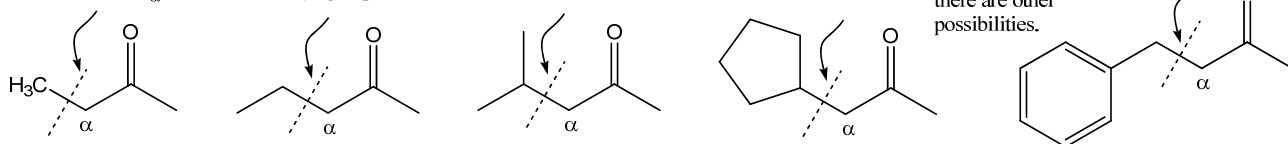
Group L (thiols from hydrogen sulfide and methyl, primary and secondary RX via S_N2 reaction, reaction, only E2 reaction at 3° R-Br in our course), Can do reaction a second time and make sulfides, R_1-S-R_2 .



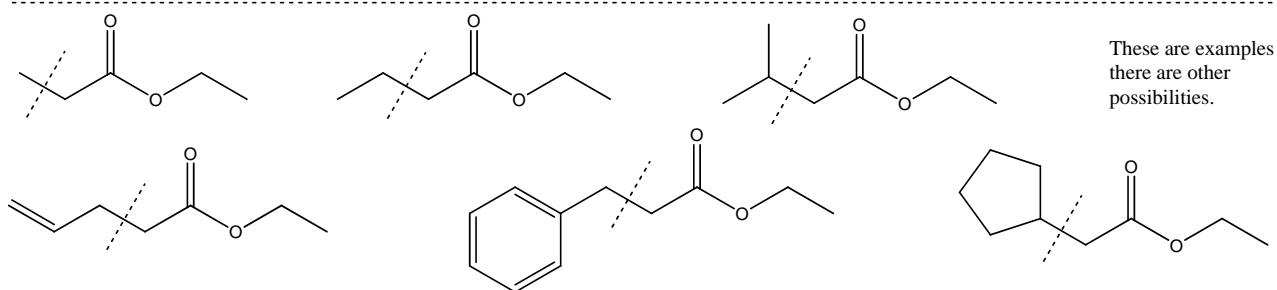
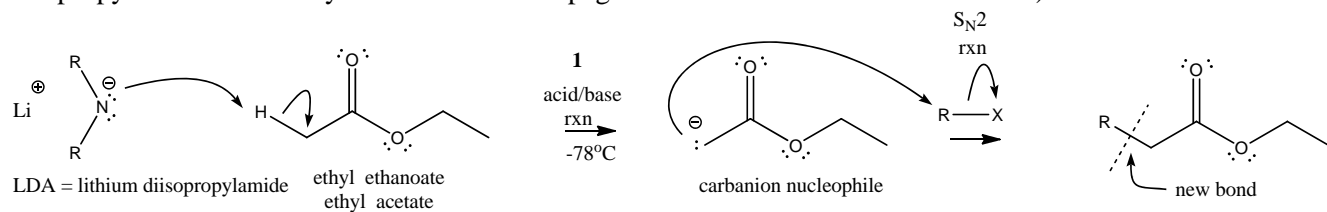
Group M (synthesis of ketones from 2-propanone (acetone) via S_N2 with propanone enolate at methyl, 1° , 2° RX. Only E1 at 3° RX. Make propanone enolate from propanone and lithium diisopropylamide = LDA at -78°C , made from diisopropylamine and n-butyl lithium shown on page 2 under useful acid/base reactions.)



New bond at C_α carbon to carbonyl group.

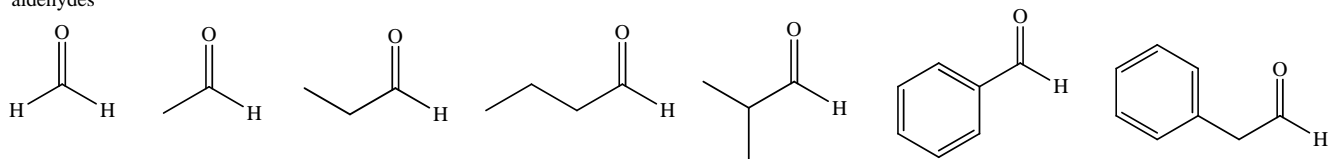


Group N (synthesis of esters from ethyl ethanoate (ethyl acetate) via S_N2 using an ester enolate at methyl, 1° , 2° RX. Only $E1$ at 3° RX. Make ester enolate from ester and lithium diisopropylamide = LDA at -78°C , made from diisopropylamine and n-butyl lithium shown on page 2 under useful acid/base reactions.)

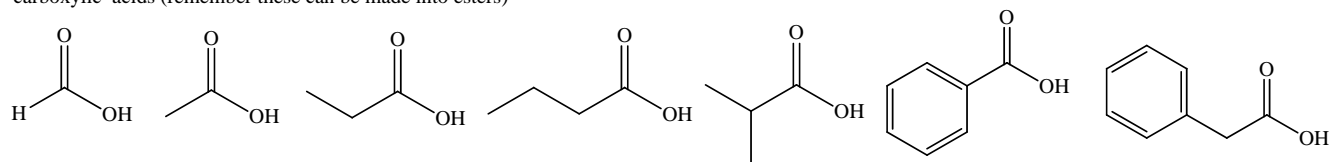


Make carbonyl compounds from alcohols (aldehydes (PCC), ketones (PCC or Jones) and carboxylic acids (Jones). There are many other methods too.

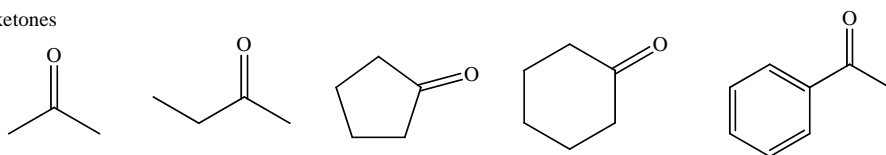
aldehydes



carboxylic acids (remember these can be made into esters)



ketones



Make acid chlorides from carboxylic acids + thionyl chloride (SOCl_2). Acid chlorides can be made into many things including esters, amides and anhydrides (for now).

acid chlorides (can be made into anhydrides, esters, amides, ketones, aldehydes and more)

