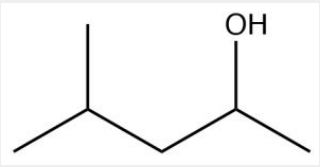
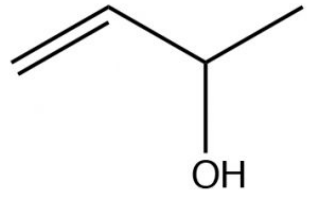
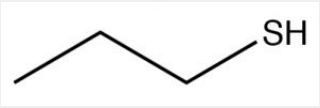
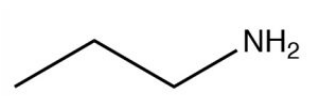
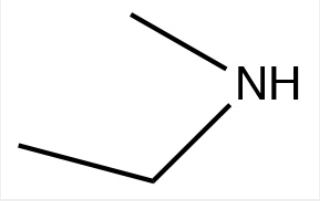
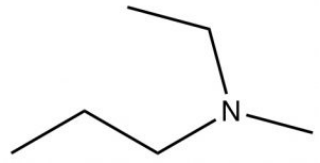
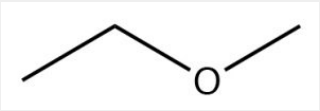
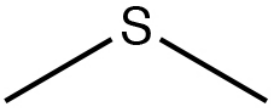
CHAPTER OVERVIEW

6: Alcohols and an introduction to thiols, amines, ethers and sulfides

In this chapter, we are going to take a closer look at the families of compounds that have carbon linked through a single covalent bond to an O, N, or S. These are known as alcohols ($R-OH$), amines ($R-NH_2$, $RR'-NH$, $RR'R''-N$), thiols ($R-SH$), ethers ($R-OR'$), and sulfides ($R-SR'$). We group these compounds together based on the predictable similarities and differences in their chemical and physical properties, specifically the fact that each of these functional groups has a relatively electronegative element (O, N or S) attached by a single bond to carbon and each has available lone electron pairs that can be donated to H^+ or other electrophiles. The result is that alcohols, thiols, and amines (primary and secondary) all have relatively acidic hydrogens, which influences their chemical reactivities, and all show nucleophilic properties.

Table 6.0.1 Examples of Functional groups, their names and approximate pK_a's

Functional Group	Example	Name	pK_a
Alcohol		Remove -ane, add -ol. 4-methylpentan-2-ol	(approximate) $\sim 15-16$
Alcohol		Alcohols take precedence over alkenes, But-3-en-2-ol	
Thiol		Longest chain, add -thiol Propane-1-thiol	~ 10
Primary amine		Longest chain, remove e, add -amine Propanamine or Propyl amine	~ 33
Secondary amine		N-methylethanamine	~ 33
Tertiary amine		N-ethyl-N-methylpropanamine	N/A
Ether		Methoxyethane Ethyl methyl ether	N/A

Sulfide		Dimethylsulfane Dimethyl sulfide	N/A

We will concentrate our discussion on oxygenated compounds, but we will note reactivities across the various groups to illustrate their similarities (and differences).
