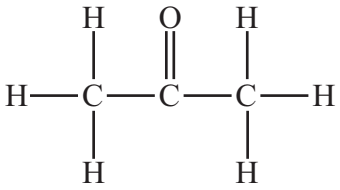
8. (a) (i)



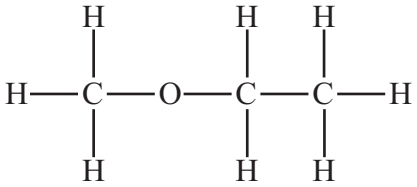
Propanone

(ii) 120°

(b) (i) Propane is very nonpolar because its structure is very symmetrical. Therefore, it does not have very strong intermolecular bonds holding the molecules together in the liquid state and is easily vaporized (low ΔH^{o}_{vap}). Propanone is not as symmetrical as propane and has a very electronegative oxygen atom that has a stronger pull for the shared electrons than the rest of the atoms in the molecule. In addition, there are two lone pairs of electrons on the oxygen. These tow facts make the portion of the molecule with the oxygen atom more negative than the rest of the molecule. Since that makes this molecule somewhat polar, it will be harder for propanone molecules to break the intermolecular bonds in the liquid state to form independent vapor molecule. Thus, propanone will have a somewhat higher ΔH^{o}_{vap}.

(ii) The double bond on the oxygen in the propanone makes the electrons between the oxygen atom and the carbon atom to which it is bonded more localized (held tighter between these two atoms) than the electrons between the oxygen atom and the carbon atom in the 1-propanol molecule. This makes the 1-propanol molecule more polar, thus, contain stronger intermolecular attractions. Further, 1-propanol will have hydrogen bonding-a very strong intermolecular bond. Therefore, 1-propanol will be harder to vaporize by breaking these intermolecular bonds in the liquid phase to become independent vapor molecules. As a result, a higher ΔH^{o}_{vap}.

(c)



Methyl ethyl ether

(d) (i) sp

(ii) There are six sigma (σ) bonds (four C--H sigma bonds, one C--C sigma bond in the C--C single bond, and one of the triple bonds between the central carbon and the carbon on the right is a sigma bond) and two pi (π) bonds (both between the two carbon atoms that contain the triple bond).