Dr. Riaz Hasan
Department of Chemistry
DSPMUniversity, Ranchi, JH-India

Effect of Solvent on SN^1 Reaction

The Solvent

What about the solvent? Do solvents have the same effect in S_N1 reactions that they have in S_N2 reactions? The answer is both yes and no. Yes, solvents have a large effect on S_N1 reactions, but no, the reasons for the effects on S_N1 and S_N2 reactions are not the same. Solvent effects in the S_N2 reaction are due largely to stabilization or destabilization of the nucleophile *reactant,* while solvent effects in the S_N1 reaction are due largely to stabilization or destabilization of the *transition state.*

The Hammond postulate says that any factor stabilizing the intermediate carbocation should increase the rate of an S_N1 reaction. Solvation of the carbocation—the interaction of the ion with solvent molecules—has such an effect. Solvent molecules orient around the carbocation so that the electron-rich ends of the solvent dipoles face the positive charge (FIGURE 11-14), thereby lowering the energy of the ion and favoring its formation.