Summary

1) Here's an important general rule to be followed in writing all reaction mechanisms. If a reaction is executed under acidic conditions, no strong bases can be present. Any negatively charged species must be a weak base (e.g., Cl^-). If a reaction is executed under basic conditions, no strong acids can be present. Any positively charged species must be a weak acid.
2) Under basic conditions, a hydroxyl group cannot be substituted directly because HO^- is too poor of a leaving group. The hydroxyl group must first be transformed into a derivative that is a suitable leaving group.
3) Under acidic conditions, the $R_3C–X^+$ bond can ionize spontaneously to give X**:** and R_3C^+. The likelihood of ionization depends on the stability of the carbocation product, the leaving group and the solvent.
4) Under acidic conditions, a lone pair nucleophile bearing a proton (e.g., H_2O, ROH, RCO_2H, RNH_2) is always deprotonated <u>after</u> it adds to the electrophile (e.g., carbocation).
5) Under acidic conditions, epoxides open by attack of the nucleophile onto the protonated ring. The nucleophile attacks the most highly substituted carbon.
6) Under basic conditions, epoxides open by nucleophilic attack onto the least substituted carbon (the reaction resembles an S_N2 reaction; the leaving group is a poor one, but the process is driven by the release of ring strain).
7) If carbocations are intermediates, rearrangement is possible.