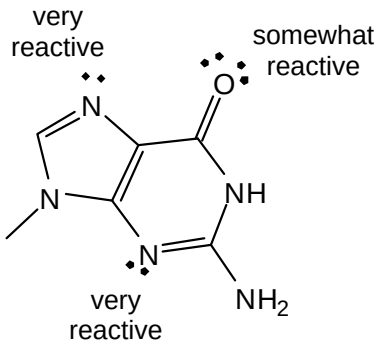
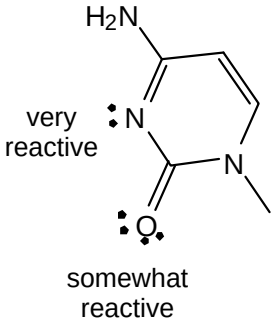
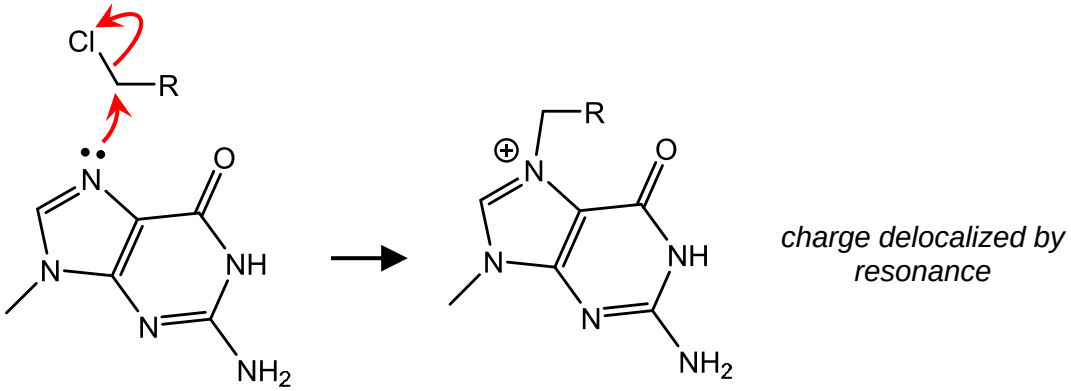
Workshop 13 Solutions
Chemotheraputic Alkylating Agents

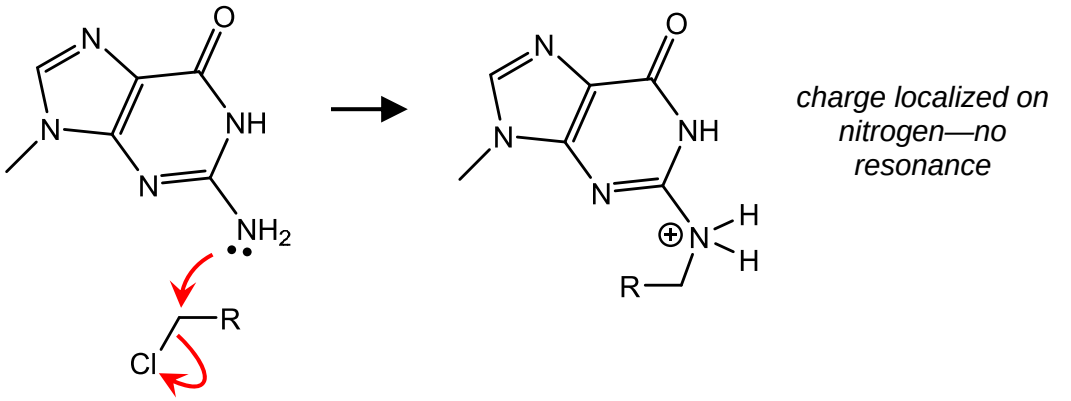
a)





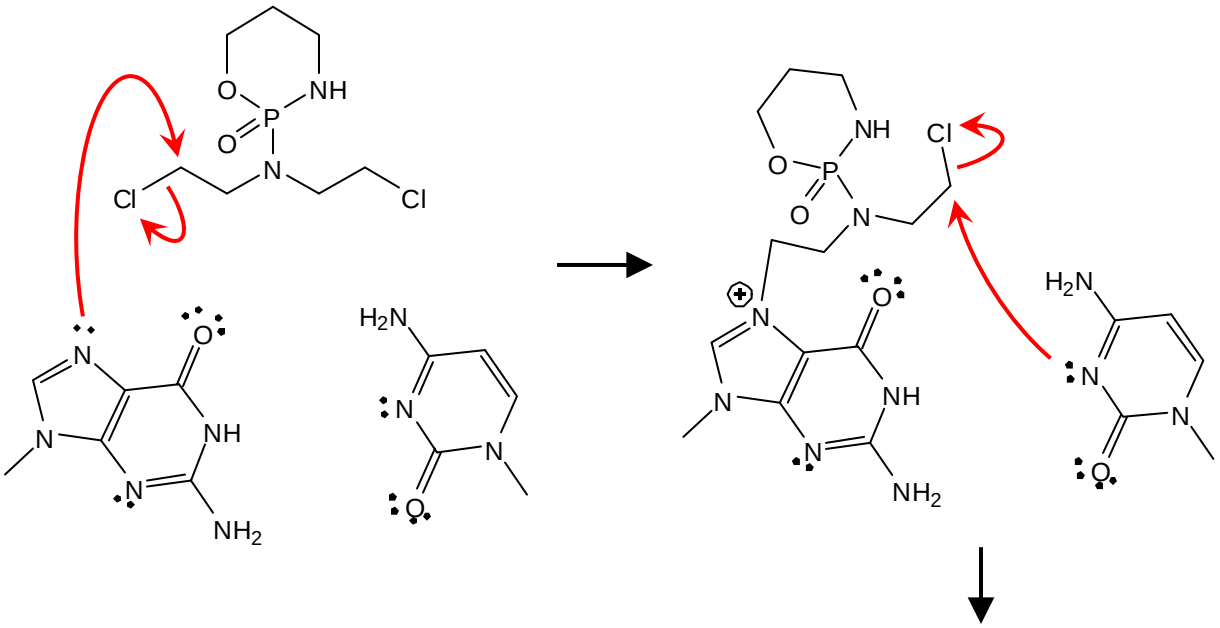
These molecules have three types of lone pairs ready for nucleophilic attack: (i) sp^2-hybridized lone pairs on nitrogen; (ii) lone pairs on oxygen, which is more electronegative than N, and so less willing to give up the lone pair; and (iii) *p*-orbital lone pairs on N that participate in orbital overlap with neighboring *p* centers (on all N's above where lone pairs are not drawn in). Reaction of these *p* lone pairs would yield products that are not stabilized by resonance.





Although product stabilities don't technically dictate reaction outcomes, Hammond's postulate says these same differences will also be felt in the transition state. So the *p* electrons are unreactive.

b)



This ties the two DNA strands together and makes the chemotherapeutic work.