

7.12: Relative Reactivities of Carboxylic Acids and Derivatives

The evidence from IR spectroscopy can help us predict the relative reactivities of carbonyls. For example: IR spectroscopy evidence tells us that the amide functional group is stabilized and the nitrogen lone pair is conjugated to the carbonyl group, whereas the partially positive charge at the acid chloride carbonyl carbon is increased (because of induction) compared to the amide. Therefore, a plausible prediction is that the acid chloride is more reactive than the amide and, as we shall see shortly, this is true. In general, the order of reactivity parallels the absorption frequency of the carbonyl group, acid chlorides are more reactive than anhydrides, esters and carboxylic acids are fairly similar in their reactivity (except with bases), and amides are the least reactive. In general, aldehydes and ketones are more reactive than all carboxylic acid derivatives except acid chlorides.

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