

The nucleophilic addition of the amine to the carbonyl is followed by a deprotonation, and then the elimination. Because amides are relatively stable, the reactions are typically fast and occur readily.

Of note: In the third case in Figure 1346, an intramolecular reaction is illustrated. Here, it is not possible to have excess of the nucleophilic base added because it is part of the molecule where the electrophile is located. The excess base is an added organic base, such as triethylamine. The reaction mechanism, as shown, is still believed to begin with the nucleophilic amine adding to the carbonyl because the internal amine has such intramolecular advantage in its reaction rate compared with the intermolecular reaction with the triethylamine. In these reactions, the added amine is simply serving as the Brønsted base that is needed during the mechanism.

Also of note: The nomenclature around amine and amide classification can appear to be a little inconsistent. Both amines and amides use primary (1°), secondary (2°), and tertiary (3°) as designations, based upon the number of attached carbon-based groups. Ammonia (NH<sub>3</sub>), which has no attached carbon

**Figure 1347**

Preparation of amides by acylation of amines with other acid derivatives: added base.

