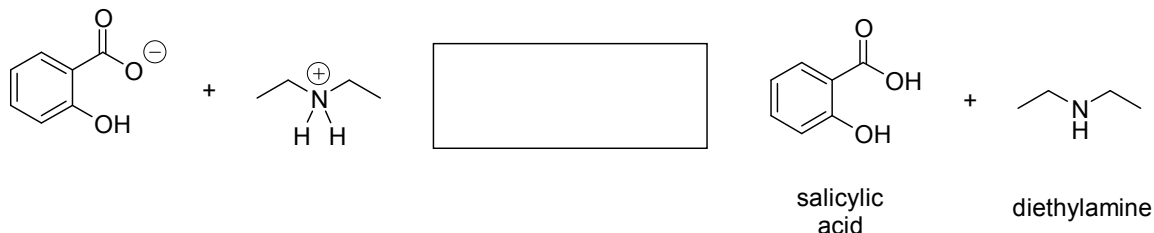
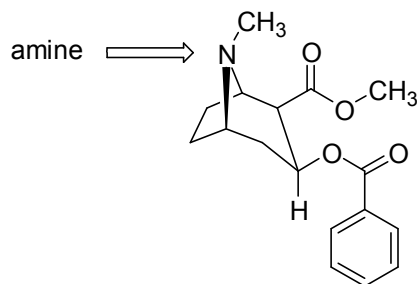


1. Salicylic acid is a precursor to aspirin. In lab, you will actually convert salicylic acid to aspirin. For this problem, let's consider the acidity of salicylic acid. Using your knowledge of the approximate  $pK_a$  values of carboxylic acids and amines, decide which side of the following equation is favored, and fill in the missing equilibrium arrows.



2. Cocaine has a basic functional group in its structure. The amine may be in the unprotonated (shown below) or protonated form. When the amine is not protonated, it is referred to as the free base form, which is crack cocaine. The protonated form is what is typically thought of as cocaine.



Let's assign a  $pK_a$  value of 10.5 to this amine. Use the Henderson-Hasselbalch equation to determine which form predominates in a solution of pH 7.5. Draw the predominate form and indicate the relative amount of the major to minor form at this pH.