Rhodium catalyzed decarbonylation has developed significantly over the last 50 years and resulted in a wide range of reported catalyst systems and reaction protocols. Besides experimental data, literature also includes mechanistic studies incorporating Hammett methods, analysis of kinetic isotope effects as well as computational studies of model systems, which give an indication of the scope of the process. In this chapter, fundamental applications of Rh-catalyzed decarbonylation reactions are surveyed and discussed, including cross-coupling reactions, tandem reactions, and alternative methodologies for process intensification.