

TABLE 9.2 Examples of enzymatic reactions developed for production of drug intermediates^[327,333]. For each drug, the table shows the disease or condition treated by the drug, the type of enzyme used for producing the drug, the specific chemical reaction catalyzed by the enzyme, and the company which developed the enzymatic process. The catalyzed reactions involve carbonyl (C=O), hydroxyl (C–OH), chloro (C–Cl), cyano (C–C≡N), amino (C–NH₂), carboxyl (COOH), ethyl-ester (COO–Et), and methyl-ester (COO–Me) groups.

Drug	Disease or Condition	Enzyme	Catalyzed Reaction	Company
Cymbalta	Depression	Ketoreductase	C=O → C–OH	Codexis
Lipitor	High cholesterol	Halohydrin dehalogenase	C–Cl → C–C≡N	Codexis
Januvia	Diabetes	Transaminase	C=O → C–NH ₂	Codexis
Lyrica	Epilepsy	Esterase	COO–Et → COOH	Pfizer
Tekturna	Hypertension	Esterase	COO–Me → COOH	DSM