The conversion of biomass to the plethora of chemicals used in modern society is one of the major challenges of the 21st century. Due to the significant differences between biomass resources and the current feedstock, crude oil, new technologies need to be developed encompassing all steps in the value chain, from pretreatment to purification. Heterogeneous catalysis is at the heart of the petrochemical refinery and will likely play an equally important role in the future biomass-based chemical industry. Three potentially important routes to chemicals from biomass are highlighted in this chapter. The conversion of biomass-derived substrates, such as glycerol, by hydrogenolysis to the important chemicals ethylene glycol and propane diols. Secondly, the conversion of carbohydrates by Lewis acidic zeolites to yield alkyl lactates, and finally the conversion of lignin, an abundant low value source of biomass, which could be a potential source of aromatics.