

A process includes a.) supplying a biomass feedstock, a fluidizing gas having hydrogen, and a catalyst recirculation stream having deoxygenating catalyst to a mixing zone of a fluidized bed reactor; b.) allowing the biomass feedstock, the fluidizing gas and the deoxygenating catalyst to move upwards through the fluidized bed reactor from the mixing zone to a bulk reactor zone; c.) allowing the biomass feedstock to contact the deoxygenating catalyst in the presence of the fluidizing gas in the bulk reactor zone of the fluidized bed reactor to produce a hydrolysis reactor output including at least one non-condensable gas, a partially deoxygenated hydrolysis product and char; and d.) withdrawing at least a portion of the deoxygenating catalyst from the bulk reactor zone to form the catalyst recirculation stream that is supplied to the mixing zone in step a).