Listing of the Claims:

1. A method of producing a high primary hydroxyl group content and a high number average molecular weight polyol, comprising:

preparing a mixture that includes a first catalyst and a low molecular weight polyether polyol having a number average molecular weight of less than 1,000 g/mol, the polyether polyol being derived from propylene oxide, ethylene oxide, or butylene oxide, and the first catalyst being a double metal cyanide catalyst;

setting the mixture to having a first temperature, adding at least one selected from propylene oxide, ethylene oxide, and butylene oxide to the mixture at the first temperature, and allowing the mixture to react to form a reacted mixture;

adding a second catalyst to the reacted mixture, the second being a Lewis acid catalyst having the general formula $M(R^1)_1(R^2)_1(R^3)_1(R^4)_{0 \text{ or } 1}$, whereas M is boron, aluminum, indium, bismuth or erbium, R^1 includes a fluoro-substituted phenyl or methyl group, R^2 includes a fluoro-substituted phenyl or methyl group, R^3 includes a fluoro-substituted phenyl or methyl group or a functional group or functional polymer group, optional R^4 is a functional group or functional polymer group; and

setting the reaction mixture including the second catalyst to have a second temperature that is less than the first temperature and adding additional at least one selected from propylene oxide, ethylene oxide, and butylene oxide to the reacted mixture at the second temperature such that a resultant polyol having a primary hydroxyl group content of at least 60 % and a number average molecular weight greater than 2,500 g/mol is formed.

2. The method as claimed in claim 1, wherein the second catalyst is a Lewis acid catalyst having the general formula $M(R^1)_1(R^2)_1(R^3)_1(R^4)_{0 \text{ or } 1}$, whereas M is boron, and R^1 and R^2 are each independently the fluoro-substituted phenyl group.

3. The method as claimed in claim 2, wherein the second catalyst is tris(pentafluorophenyl)borane or a pentafluorophenylborane based catalyst complex with the functional group or functional polymer group.