Claims

1. A method for preparing amino-terminated polyether by catalytic reductive amination of polyether glycol in the presence of hydrogen, at least one aminating agent, and a catalyst, the method comprises the following steps:

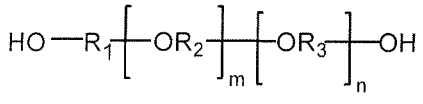
in the presence of a Raney catalyst, contacting polyether glycol having a number-average molecular weight of no less than 100 with at least one aminating agent and hydrogen in a reactor to proceed catalytic reductive amination reaction; and

cooling down obtained reaction mixture to 25-60°C, removing unreacted gas, discharging the reaction mixture, and removing water, residual aminating agent and other low-boiling by-products from the reaction mixture by reduced pressure distillation, so as to obtain amino-terminated polyether;

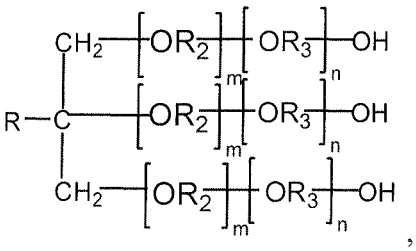
wherein the amount of the Raney nickel catalyst is 2-15% of the amount of the polyether glycol by weight; the amount of the aminating agent is 1.5-20 times of the amount of hydroxyl groups in the polyether glycol by mole, and the amount of hydrogen is 0.4-15 times of the amount of hydroxyl groups in the polyether glycol by mole; the catalytic reductive amination reaction is conducted at a temperature of 120-250°C and a pressure of 8-35MPa for a period duration of 1.5-8h;

the Raney nickel catalyst consists of~~comprises~~ Ni, Al, and metal M, based on the total weight of the Raney nickel catalyst and calculated by element, the content of Ni is in a range of 80-95wt%, the content of Al is in a range of 5-20wt%, and the content of metal M is in a range of 0.5-5wt%; and the metal M is one, two, or three selected from Cr, Fe, Cu, and Zn.

2. The method according to claim 1, wherein the polyether glycol has the following general structural formula (a) or (b):

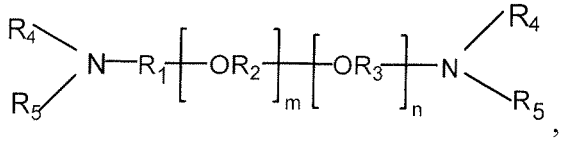
(a) ,

in formula (a), R_1, R_2, and R_3 are independently selected from linear or branched divalent aliphatic groups with 2-4 carbon atoms; m is 0-115; n is 0-115; and the sum of m and n is 1-115;

(b) ,

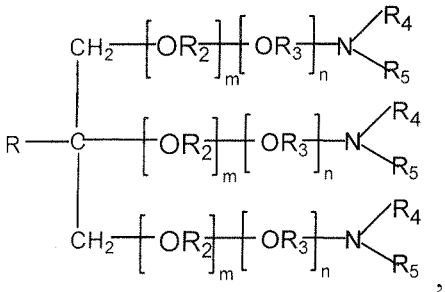
in formula (b), R is selected from hydrogen and linear or branched aliphatic groups having 1-6 carbon atoms; R_2 and R_3 are independently selected from linear or branched divalent aliphatic groups having 2-4 carbon atoms; m is 0-40; n is 0-40; and the sum of m and n is 1-115.

3. The method according to claim 1, wherein the amino-terminated polyether has the following general structural formula (c) or (d):

(c) ,

in formula (c), R_1, R_2, and R_3 are independently selected from linear or branched divalent aliphatic groups with 2-4 carbon atoms; R_4 and R_5 are identical or different,

and are independently selected from hydrogen and linear or branched aliphatic groups having 1-6 carbon atoms; m is 0-115; n is 0-115; and the sum of m and n is 1-115;

(d) ,

in formula (d), R is selected from hydrogen and linear or branched aliphatic groups having 1-6 carbon atoms; R_2 and R_3 are independently selected from linear or branched divalent aliphatic groups having 2-4 carbon atoms; R_4 and R_5 are identical or different, and are independently selected from hydrogen and linear or branched aliphatic groups having 1-6 carbon atoms; m is 0-40; n is 0-40; and the sum of m and n is 1-115.

4. The method according to claim 1, wherein the Raney nickel catalyst is prepared by the method comprising the following steps:

a) adding ternary, quaternary, or quinary alloy powder ~~comprising different components~~ into water solution of sodium hydroxide under vigorous agitation and stirring at a temperature of 45-100° C for a period duration of 0.5-5h, to dissolve the alloy powder, then reacting at a temperature of 50-100°C for a period duration of 0.5-5h to activate, wherein the concentration of sodium hydroxide is 10-40wt%, the amount of sodium hydroxide is 1-3 times of the weight of the alloy powder;

b) standing the mixture obtained by step (1) to separate the supernatant white flocculate, washing black precipitate with warm water for several times to neutrality,

and then washing with anhydrous ethanol for 2-5 times to obtain Raney nickel catalyst; next, storing the Raney nickel catalyst in anhydrous ethanol;

wherein, the alloy powder consists of~~comprises~~ Ni, Al, and metal M, wherein, the metal M is one, two, or three selected from Cr, Fe, Cu, and Zn.

5. The method according to claim 1, wherein the aminating agent is selected from methylamine, dimethylamine, ethylamine, diethylamine, *n*-propylamine, *di-n*-propylamine, isopropylamine, diisopropylamine, hexylamine, and cyclohexylamine.

6. The method according to claim 1, wherein the amount of hydrogen is controlled by regulating the pressure of hydrogen filling into the reactor in the range of 1.5-8MPa.

7. The method according to claim 1, wherein the reduced pressure distillation is conducted at a temperature of 100-120°C and a vacuum degree of from -0.08MPa to -0.1MPa.

8. The method according to claim 1, wherein the reactor is a stirred reactor.