Seeding Process for the Manufacture of Polymer Modified Polyols

FIELD OF THE INVENTION

[0001] Embodiments of the invention relate to polyols, more specifically to polymer polyols.

BACKGROUND OF THE INVENTION

[0002] Polyurethane foams are produced by the reaction of polyisocyanates and polyols in the presence of a blowing agent. In order to improve load-bearing and other foam properties, so-called polymer polyol products have been developed. A common type of polymer polyol is a dispersion of vinyl polymer particles in a polyol. Examples of vinyl polymer particle polyols include so-called "SAN" polyols, which are dispersions of styrene-acrylonitrile. Other common types of polymer polyols are so-called "PHD" polyols (dispersions of polyurea particles) and so-called "PIPA" (polyisocyanate polyaddition) polyols (dispersions of polyurethane and/or polyurethane-urea particles). PIPA and PHD particles may be produced by introducing the appropriate co-reactant or co-reactants into a polyol or polyol blend and reacting the co-reactant(s) with a polyisocyanate in order to polymerize the co-reactant(s). However, the resulting polymer polyols may have high viscosity at high particle concentrations.

[0003] Therefore, there is a need for a seeding additive to help producing high solids polymer polyols having low viscosities and good storage stability.

SUMMARY ~~OF THE INVENTION~~

[0004] Embodiments of the ~~invention~~ present disclosure provide for seeding additives to help produce high solids polymer polyols having low viscosities. The seeding additive may be a solid at room temperature and does not participate in the chemical reaction, i.e. are not reactive with isocyanates, in order to not to interfere with the polymer polyol formation, but acts only as a physical seeding for the formation of the particles in-situ in the carrier polyol.

[0004a] In a first aspect of the present disclosure, there is provided a method of producing a polymer polyol, the method comprising:

providing at least one first composition comprising at least one polyol, at least one isocyanate non-reactive seed population, and at least one of a co-reactant, wherein the at least one isocyanate non-reactive seed population comprises less than about 5% by weight of the total weight of the first composition, the seed population has a maximum particle diameter of less than 10 μm, and the co-reactant has an equivalent weight of up to 400 and at least one active hydrogen attached to a nitrogen or oxygen atom; and

combining the first composition with at least one polyisocyanate under mixing to form at least one of a polyurea, polyurethane, and a polyurethane-urea particle population dispersed in the first composition, wherein at least 90% by weight of the particle population has a particle diameter of less than 100 μm.

[0004b] In a second aspect of the present disclosure, there is provided a polymer polyol comprising a reaction product of a reaction system, the reaction system comprising:

at least one first composition comprising at least one polyol, at least one isocyanate non-reactive seed population, and at least one of a co-reactant, wherein the at least one isocyanate non-reactive seed population comprises less than about 5% by weight of the total weight of the first composition, the seed population has a maximum particle diameter of less than 10 μm, and the co-reactant has an equivalent weight of up to 400 and at least one active hydrogen attached to a nitrogen or oxygen atom; and

at least one polyisocyanate, wherein the polymer polyol has a particle population wherein at least 90% by weight of the particle population has a maximum particle diameter of less than 100 μm.

[0004c] In a third aspect of the present disclosure, there is provided a polyurethane foam comprising the reaction product of a reaction mixture, the reaction mixture comprising:

the polymer polyol as defined above; and

at least one polyisocyanate.

[0005] In an embodiment, a method of producing a polymer polyol is provided. The method includes providing at least one first composition which includes at least one polyol, at least one isocyanate non-reactive seed population, and at least one of a co-reactant having an equivalent weight of up to 400 and at least one active hydrogen attached to a nitrogen or oxygen atom. The at least one isocyanate non-reactive seed population includes less than about 5% by weight of the total weight of the first composition, and the seed population has a maximum particle diameter of less than 10 μm. The first composition is combined with at least one polyisocyanate under mixing to form at least one of a polyurea, polyurethane, and a polyurethane-urea particle