D. Second Alkylation and Third Amidation

Alkylation of the aforementioned second amidation product with methyl acrylate and then amidation of the resulting alkylated product with MEDA in accordance with aforementioned procedures yield a mixture of isomers having core branches with dendritic characteristics.

What is claimed is:

1. A dense star polymer having at least one core branch emanating from a core, each core branch having at least one terminal group and amidoamine linkages provided that (1) the ratio of terminal groups to the branches emanating from the core is two or greater, (2) the density of terminal groups in the polymer is at least 1.5 times that of a conventional star polymer having a comparable molecular weight and number of core branches, each of such branches of the conventional star polymer bearing only one terminal group, and (3) a molecular volume that is no greater than 60 percent of the molecular volume of said conventional star polymer.

2. The dense star polymer of claim **1** having (1) at least 2 core branches per core, (2) a terminal group density at least 5 times that of the corresponding conventional star polymer, and (3) a molecular volume that is equal to or less than 50 percent of the volume of the conventional star polymer.

3. A dendrimer having a polyvalent core that is covalently bonded to at least 1 ordered dendritic branch which extends to two generations such that each dendritic branch has at least four terminal groups and a symmetrical structure.

4. The polymer of claim **1** wherein the dendritic branches contain amidoamine linkages.

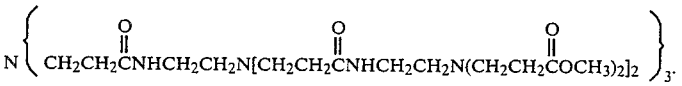
5. The polymer of claim **1** wherein the core is derived from a nucleophilic compound and the branches are polyamidoamines wherein the terminal groups are primary amine groups.

6. The polymer of claim **1** wherein the core is derived from a nucleophilic compound having a plurality of active hydrogens capable of undergoing a Michael's addition reaction with an ethylenically unsaturated group.

7. The polymer of claim **5** wherein (1) the nucleophilic compound has a plurality of active hydrogens capable of undergoing a Michael's addition reaction with an ethylenically unsaturated group and (2) the branches are polyamidoamine which is derived from the reaction of an alkyl ester of an α,β-ethylenically unsaturated carboxylic acid or an α,β-ethylenically unsaturated amide and an alkylene polyamine or a polyalkylene polyamine.

8. The polymer of claim **7** wherein the nucleophilic compound is ammonia, the ester is methyl acrylate and the alkylene polyamine is ethylenediamine.

9. The polymer of claim **1** which is represented by the formula:



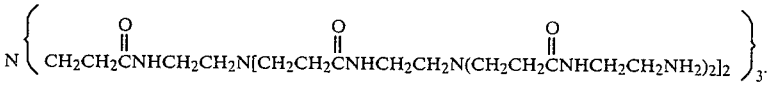
10. A dendrimer having (1) a polyvalent core derived from a nucleophilic compound selected from the group consisting of ammonia and (2) at least two ordered dendritic polyamidoamine core branches which (a) are covalently bonded to the polyvalent core, (b) extend through at least two generations, and (c) have at least 3 terminal groups per core branch.

11. The dendrimer of claim **10** wherein (1) the dendritic core branches are derived from (a) methyl acrylate, ethyl acrylate, acrylamide or maleic anhydride and (b) a polyamine, an alkanolamine or an aziridine and (2) there are from 4 to 1024 terminal groups per core branch.

12. The dendrimer of claim **11** wherein (1) the core is derived from ammonia or a polyalkylene polyamine and (2) the core branch is derived from methyl acrylate and ethylenediamine or diethylenetriamine.

13. The dense star polymer of claim **2** having at least 3 core branches per core.

14. A polymer which is represented by the formula:



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