CLAIMS

1. A polymer having at least the following characteristics:

(a) a block styrene content with more than 6 consecutive styrene units from about 15 to about 35 weight percent based on total styrene content in the polymer;

(b) a vinyl content from about 25 to about 80 weight percent based on total amount of polymerized 1,3-diene;

(c) a styrene content from about 35 to about 75 weight percent based on total weight of polymer; and

(d) a molecular weight distribution (Mw/Mn) of 1.5 or less.

2. The polymer of claim 1 having at least the following additional characteristic: (e) a block styrene content with more than 4 consecutive styrene units from about 60 to about 80 weight percent based on total styrene content in the polymer, preferably a block styrene content with more than 6 consecutive styrene units of from about 15 to about 30 weight percent based on total styrene content in the polymer, and most preferably a block styrene content with more than 6 consecutive styrene units of from about 20 to about 30 weight percent based on total styrene content in the polymer.

3. The polymer as in any of the preceding claims having a styrene content of between about 35 and about 65 weight percent based on total styrene content, preferably between about 50 and about 60.

4. The polymer as in any of the preceding claims having a molecular weight distribution (Mw/Mn) from about 1.05 to about 1.5, preferably from about 1.1 to about 1.45, more preferably from about 1.2 to about 1.4.

5. The polymer as in any of the preceding claims wherein the 1,3-diene comprises 1,3-butadiene.

6. The polymer as in any of the preceding claims having a number-average molecular weight (Mn) greater than or equal to about 200,000 g/mole, preferably greater than or equal to about 300,000 g/mole, or greater than or equal to about 500,000 g/mole.

7. The polymer as in any of the preceding claims having a weight-average molecular weight (Mw) greater than or equal to about 300,000 g/mole, preferably greater than or equal to about 400,000 g/mole, or greater than or equal to about 600,000 g/mole.

8. A composition comprising the polymer as in any of the preceding claims and optionally at least one additive.

9. An article comprising at least one component formed from the composition of claim 8.

10. A process for polymerization of a polymer comprising monomeric units derived from a styrene monomer and a 1,3-diene monomer, the process comprising:

polymerizing the monomeric units in the presence of an initiator which may comprise n-butyllithium, a potassium alcoholate and an organic ether compound;

wherein the organic ether compound is selected among dialkylethers of the formula R^1-O-CH_2-CH(R^3)-O-R^2, wherein R^1 and R^2 independently represent alkyl groups with 1 to 10 carbon atoms, R^3 represents hydrogen, methyl or ethyl, such as 2-(2-ethoxyethoxy)-2-methylpropane and wherein the molar ratio of potassium alcoholate to active initiator is 0.4 mol/mol or less, preferably between about 0.01 and about 0.4, more preferably between about 0.05 and about 0.3.

11. The process of claim 10 wherein R^1 is methyl or ethyl and R^2 is a branched alkyl group, preferably t-butyl and R^3 may represent hydrogen

12. The process as in any of claims 10 or 11 wherein the potassium alcoholate comprises potassium-3,7-dimethyl-3-octylate.

13. The process as in any of claims 10 to 12 wherein the polymerization is run at a temperature of about 90 °C or less, preferable between about 10 °C and about 85 °C, more preferably between 20 °C and 80 °C.

14. The process as in any of claims 10 to 13 wherein the molar ratio of the dialkylether to the potassium alcoholate is between about 55:1 and about 5:1, preferably between about 45:1 and about 10:1 and/or the molar ratio of dialkylether to active initiator is between about 0.5 and about 10, preferably between about 1 and about 5.

15. The process as in any of claims 10 to 14 wherein total monomer conversion is greater than about 96 weight percent based on total amount of monomer feed, preferably greater than about 98 weight percent, and more preferably greater than about 99 weight percent.

CLAIMS

1. A polymer having at least the following characteristics:

(a) a block styrene content with more than 6 consecutive styrene units from about 15 to about 35 weight percent based on total styrene content in the polymer;

(b) a vinyl content from about 25 to about 80 weight percent based on total amount of polymerized 1,3-diene;

(c) a styrene content from about 35 to about 75 weight percent based on total weight of polymer; and

(d) a molecular weight distribution (Mw/Mn) of 1.5 or less.

2. The polymer of claim 1 having at least the following additional characteristic:

(e) a block styrene content with more than 4 consecutive styrene units from about 60 to about 80 weight percent based on total styrene content in the polymer.

3. The polymer of claim 1 having a styrene content of between about 35 and about 65 weight percent based on total styrene content.

4. The polymer of claim 1 having a molecular weight distribution (Mw/Mn) from about 1.05 to 1.5.

5. The polymer of claim 1 wherein the 1,3-diene comprises 1,3-butadiene.

6. The polymer of claim 1 having a number-average molecular weight (Mn) greater than or equal to about 200,000 g/mole.

7. The polymer of claim 1 having a weight-average molecular weight (Mw) greater than or equal to about 300,000 g/mole.

8. A composition comprising the polymer of claim 1 and at least one additive.

9. An article comprising at least one component formed from the composition of claim 8.

10. A process for polymerization of a polymer comprising monomeric units derived from a styrene monomer and a 1,3-diene monomer, the process comprising:

polymerizing the styrene monomer and the 1,3-diene monomer in the presence of an active initiator, a potassium alcoholate comprising potassium-3,7-dimethyl-3-octylate, and an organic ether compound;

wherein the organic ether compound is selected among dialkylethers of the formula R^1--O--CH_2--$CH(R^3)$--O--R^2, wherein R^1 and R^2 independently represent alkyl groups with 1 to 10 carbon atoms, R^3 represents hydrogen, methyl or ethyl and wherein the molar ratio of potassium alcoholate to active initiator is 0.4 mol/mol or less.

11. The process of claim 10 wherein R^1 is methyl or ethyl and R^2 is a branched alkyl group.

12. The process of claim 10 wherein the polymerization is run at a temperature of about 90° C. or less.

13. The process of claim 10 wherein the molar ratio of the dialkylether to the potassium alcoholate is between about 55:1 and about 5:1 and/or the molar ratio of dialkylether to active initiator is between about 0.5 and about 10.

14. The process of claim 10 wherein total monomer conversion is greater than about 96 weight percent based on total amount of monomer feed.