WHAT IS CLAIMED IS:

1. A process for producing poly(1,2-butylene oxide) polymers, comprising polymerizing 1,2-butylene oxide or a mixture of at least 50% by weight 1,2-butylene oxide and up to 50% by weight of a copolymerizable alkylene oxide at a polymerization temperature of 90 to 160°C in the presence of enough of a double metal cyanide catalyst to provide a cobalt concentration of 1 to 6 parts per million in the product and in the presence of a hydroxylic initiator compound to form a polymer or copolymer of 1,2-butylene oxide having at least one block of homopolymerized or randomly copolymerized 1,2-butylene oxide having a number average weight of at least 500 atomic mass units and which contains no more than 25 microequivalents per gram of monofunctional, unsaturated species.

2. A poly(1,2-butylene oxide) polymer made in accordance with claim 1.

~~3. The poly(1,2-butylene oxide) polymer of claim 2 which contains no more than 75 microequivalents per gram of monofunctional, unsaturated species.~~

~~4. The poly(1,2-butylene oxide) polymer of claim 2 which contains no more than 25 microequivalents per gram of monofunctional, unsaturated species.~~

~~5~~3. ~~A~~The process of claim 1, wherein ~~for producing a poly(1,2-butylene oxide) polymer, comprising polymerizing 1,2-butylene oxide or a mixture of at least 50% by weight 1,2-butylene oxide and up to 50% by weight of a copolymerizable alkylene oxide at a polymerization temperature of 90 to 160°C in the presence of a hydroxylic initiator compound and enough of a zinc hexacyanocobaltate catalyst complex to provide a cobalt concentration of 1 to 6 parts per million in the product, to form a polymer or copolymer of 1,2-butylene oxide having at least one block of homopolymerized or randomly copolymerized 1,2-butylene oxide,~~ said at least one block of homopolymerized or randomly copolymerized 1,2-butylene oxide has~~having~~ a number average weight of 800 to 2500 atomic mass units~~, wherein the polymer or copolymer contains no more than 25 microequivalents per gram of monofunctional, unsaturated species~~.

64. The process of claim 5—3 wherein 1,2-butylene oxide is homopolymerized to form at least one block of homopolymerized 1,2-butylene oxide.

75. The process of claim 46 wherein the polymerization temperature is 110 to 140°C.

86. The process of claim 6—4 or 57 wherein enough of the zinc hexacyanocobaltate catalyst complex is present to provide a cobalt concentration of 1 to 3 parts per million in the product.

97. The process of claim 8-6 wherein the polymerization temperature is 110 to 120°C.

~~10. A process for producing poly(1,2-butylene oxide) polymers, comprising polymerizing 1,2-butylene oxide or a mixture of at least 50% by weight 1,2-butylene oxide and up to 50% by weight of a copolymerizable alkylene oxide at a polymerization temperature of 90 to 160°C in the presence of a hydroxylic initiator compound and enough of a zinc hexacyanocobaltate catalyst complex to provide a cobalt concentration of 1 to 6 parts per million in the product, to form a polymer or copolymer of 1,2-butylene oxide having at least one block of homopolymerized or randomly copolymerized 1,2-butylene oxide, said at least one block having a number average weight of 2501 to 4500 atomic mass units, wherein the polymer or copolymer contains no more than 75 microequivalents per gram of monofunctional, unsaturated species.~~

~~11. The process of claim 10 wherein 1,2-butylene oxide is homopolymerized to form at least one block of homopolymerized 1,2-butylene oxide.~~

~~12. The process of claim 10 or 11 wherein the polymerization temperature is 110 to 140°C.~~

~~13. The process of claim 11 or 12 wherein enough of the zinc hexacyanocobaltate catalyst complex is present to provide a cobalt concentration of 1 to 3 parts per million in the product.~~

~~14. The process of claim 13 wherein the polymerization temperature is 110 to 120°C.~~

~~15. A polymer or copolymer of 1,2-butylene oxide having at least one block of homopolymerized 1,2-butylene oxide having a number average weight of 800 to 4500 atomic mass units and/or at least one block of randomly copolymerized 1,2-butylene oxide having a number average weight of 800 to 4500 atomic mass units which randomly copolymerized block contains at least 50 weight percent polymerized 1,2-butylene oxide, wherein the polymer or copolymer contains 1 to 6 parts per million of cobalt residue from a zinc hexacyanocobaltate catalyst complex and no more than 75 microequivalents per gram of monofunctional, unsaturated species.~~

~~16. The polymer or copolymer of claim 15 having at least one block of homopolymerized 1,2-butylene oxide having a number average weight of 800 to 2500 atomic mass units and/or at least one block of randomly copolymerized 1,2-butylene oxide having a number average weight of 800 to 2500 atomic mass units which randomly copolymerized block contains at least 50 weight percent polymerized 1,2-butylene oxide, wherein the polymer or copolymer contains no more than 25 microequivalents per gram of monofunctional, unsaturated species.~~

~~17. The polymer or copolymer of claim 16 which contains 1 to 3 parts per million of cobalt residues from a zinc hexacyanocobaltate catalyst complex.~~

~~18. The polymer or copolymer of claim 15 having at least one block of homopolymerized 1,2-butylene oxide having a number average weight of 2501 to 4500 atomic mass units and/or at least one block of randomly copolymerized 1,2-butylene oxide having a number average weight of 2501 to 4500 atomic mass units which randomly copolymerized block contains at least 50 weight percent polymerized 1,2-butylene oxide.~~