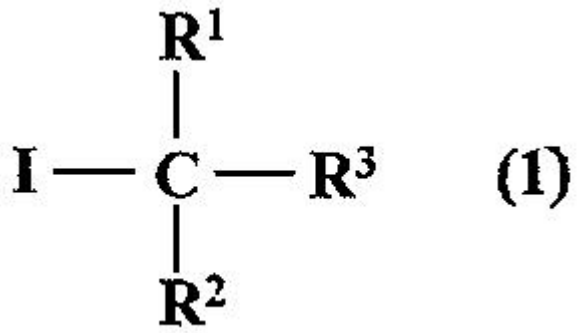
CLAIMS

1. A molecular weight controlling agent for radical polymerization comprising an iodine compound represented by the following formula (1) as an active ingredient, wherein a solubility of the active ingredient in water is 0.5% by weight or more at 20°C, which is to be used for radical polymerization of a water-soluble vinyl monomer,

[Chemical Formula 1]



(1)

wherein R^1 is -COOX, -CONR^{4}R^5, an aromatic hydrocarbon ring group which may have a substituent, or an aromatic heterocyclic group which may have a substituent, or a cyano group, X is a hydrogen atom, an optionally substituted straight or a branched aliphatic hydrocarbon ring group having 1 to 12 carbon atoms or an alicyclic hydrocarbon ring group having 3 to 12 carbon atoms, an alkali metal, an alkaline earth metal, an organic ammonium or an ammonium, and R^2, R^3, R^4, and R^5 each independently represent a hydrogen atom, an optionally substituted aromatic hydrocarbon ring group, an optionally substituted aromatic heterocyclic ring group, or an optionally substituted straight or branched aliphatic hydrocarbon group having 1 to 12 carbon atoms or an alicyclic hydrocarbon group having 3 to 12 carbon atoms, and two or more groups of R^2, R^3, R^4, R^5 and X may be bonded to each other and form a saturated or unsaturated, 5- or 6-membered ring, and

each of the substituents may be selected from a group consisting of a halogen atom, a hydroxyl group, an optionally substituted straight or branched alkyl group having 1 to 12 carbon atoms or an alicyclic hydrocarbon group having 3 to 6 carbon atoms, an optionally substituted aromatic hydrocarbon ring group or an optionally substituted aromatic heterocyclic ring group, an optionally substituted non-aromatic heterocyclic ring group, a linear or branched alkoxy group of 1 to 12 carbon atoms, a cyano group, a carboxyl group, and a nitro group.

2. The molecular weight controlling agent for radical polymerization according to claim 1, wherein two or more groups of R^2, R^3, R^4, R^5 and X are bonded to each other and form a saturated or unsaturated, 5- or 6-membered ring.

3. The molecular weight controlling agent for radical polymerization according to claim 1 or 2, wherein the active ingredient has a hydrophilic functional group.

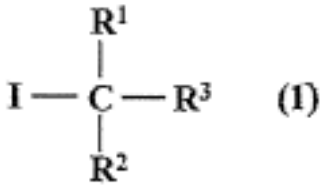
4. The molecular weight controlling agent for radical polymerization according to claim 3, wherein the hydrophilic functional group is a carboxyl group, a salt of a carboxyl group, a hydroxyl group or an amide group.

5. The molecular weight controlling agent for radical polymerization according to any one of claims 1 to 4, wherein the solubility of the active ingredient in water is 1% by weight or more at 20°C.

6. A method for producing a polymer, comprising a step of carrying out radical polymerization of a raw material vinyl monomer comprising a water-soluble vinyl monomer (a1) and/or a vinyl monomer (a2) that becomes the water-soluble vinyl monomer

(a1) through hydrolysis, wherein the radical polymerization is carried out in the presence of water and a molecular weight controlling agent for radical polymerization comprising an iodine compound represented by the following formula (1) as an active ingredient and having a solubility of the active ingredient in water of 0.5% by weight or more at 20°C,

[Chemical Formula 2]



(1)

wherein R^1 is -COOX, -CONR^{4}R^5, an aromatic hydrocarbon ring group which may have a substituent, or an aromatic heterocyclic group which may have a substituent, or a cyano group, X is a hydrogen atom, an optionally substituted straight or branched aliphatic hydrocarbon ring group having 1 to 12 carbon atoms or an alicyclic hydrocarbon ring group having 3 to 12 carbon atoms, an alkali metal, an alkaline earth metal, an organic ammonium or an ammonium, and R^2, R^3, R^4, and R^5 each independently represent a hydrogen atom, an optionally substituted aromatic hydrocarbon ring group, an optionally substituted aromatic heterocyclic ring group, or an optionally substituted straight or branched aliphatic hydrocarbon group having 1 to 12 carbon atoms or an alicyclic hydrocarbon group having 3 to 12 carbon atoms, and two or more groups of R^2, R^3, R^4, R^5 and X may be bonded to each other and form a saturated or unsaturated, 5- or 6-membered ring, and each of the substituents may be selected from a group consisting of a halogen atom, a hydroxyl group, an optionally substituted straight or branched alkyl group having 1 to 12 carbon atoms or an alicyclic hydrocarbon group having 3 to 6 carbon atoms, an optionally substituted aromatic hydrocarbon ring group or an optionally substituted aromatic heterocyclic ring group, an optionally substituted non-aromatic

heterocyclic ring group, a linear or branched alkoxy group of 1 to 12 carbon atoms, a cyano group, a carboxyl group, and a nitro group.

7. The method for producing a polymer according to claim 6, wherein two or more groups of R^2, R^3, R^4, R^5 and X are bonded to each other and form a saturated or unsaturated, 5- or 6-membered ring.

8. The method for producing a polymer according to claim 6 or 7, wherein the active ingredient has a carboxyl group, a salt of a carboxyl group, a hydroxyl group, or an amide group.

9. The method for producing a polymer according to any one of claims 6 to 8, wherein the solubility of the active ingredient of the molecular weight controlling agent for radical polymerization in water is 1% by weight or more at 20°C.

10. The method for producing a polymer according to any one of claims 6 to 9, wherein use of the molecular weight controlling agent for radical polymerization in terms of an amount of the active ingredient is 0.0005 to 1% by weight relative to a total weight of the raw material vinyl monomer.

11. The method for producing a polymer according to any one of claims 6 to 10, wherein the water-soluble vinyl monomer (a1) is (meth)acrylic acid (salt).

12. The method for producing a polymer according to any one of claims 6 to 11, wherein the radical polymerization is carried out in presence of an internal crosslinking agent (b).

13. The method for producing a polymer according to any one of claims 6 to 12, wherein a resulting polymer is a water-

absorbent resin particle having a water retaining capacity of 30 g/g or more with respect to physiological saline at 25°C.