CLAIMS

1. A process for preparing polythiols comprising at least the steps of:

a/ preparing a sulfhydration reaction medium comprising the bringing into contact of:

- at least one polyene;
- at least one radical initiator;
- at least one acid catalyst;
- at least one sulfhydryl group donor compound;
- optionally, at least one solvent;

b/ simultaneously carrying out the radical sulfhydration reaction of said at least one polyene and the acid-catalyzed sulfhydration reaction of said at least one polyene;

c/ recovering a mixture comprising at least two polythiols.

2. The process according to claim 1, wherein said at least one polyene is a compound with a hydrocarbon chain that comprises at least two unsaturations in double bond form, it being possible for said chain to be linear or cyclic, saturated or unsaturated, and to optionally comprise one or more heteroatoms chosen from columns 15, 16 and 17 of the Periodic Table of the Elements, and more particularly those chosen from sulfur, nitrogen, oxygen and phosphorus, and to be interrupted or substituted by one or more aromatic groups.

3. The process according to any one of the preceding claims, wherein said at least one polyene is a hydrocarbon compound comprising from 2 to 20 double bonds, preferably from 2 to 16 double bonds, in particular from 2 to 10 double bonds, very particularly from 2 to 8 double bonds, and more particularly from 2 to 4 double bonds, limits included.

4. The process according to any one of the preceding claims, wherein said at least one polyene is chosen from triallyisocyanurate and derivatives thereof, terpenes and derivatives thereof, comprising at least two double bonds.

5. The process according to any one of the preceding claims, wherein said at least one radical initiator is chosen from a thermal or photochemical initiator and a radical-generating organic or mineral compound, taken alone or as a combination of two or more thereof.

6. The process according to claim 5, wherein said at least one radical initiator is chosen from peroxides, hydroperoxides, azobisisobutyronitrile, 2,2-dimethoxy-1,2-diphenylethan-1-one, alkyl phosphites and xanthene derivatives, taken alone or as a combination of two or more thereof.

7. The process according to any one of the preceding claims, wherein said at least one acid catalyst is chosen from Lewis acids, sulfonated acid resins and catalytic compositions comprising at least one metal salt, taken alone or as a combination of two or more thereof.

8. The process according to any one of the preceding claims, wherein said at least one sulfhydryl group donor compound is chosen from hydrogen sulfide, thiocarboxylic acids and precursors thereof, taken alone or as a combination of two or more thereof.

9. The process according to any one of the preceding claims, carried out in the absence of solvent.

10. A mixture of at least two polythiols comprising primary thiols and secondary and/or tertiary thiols obtained according to the process as claimed in any one of claims 1 to 9.

11. The use of the mixture according to claim 10 or obtained as claimed in the process of any one of claims 1 to 9, as crosslinking or vulcanizing agent, reagent for the preparation of sulfur-containing compounds such as thiourethanes, polysulfides and the like, chain transfer agent, metal complexing agent, ore flotation agent, antioxidant, heat stabilizer.