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linear or branched alkyl group having 1 to 10 carbon atoms (for example, a methyl group, an ethyl group, a propyl group, a butyl group or a pentyl group) and an aliphatic hydrocarbon ring group having 3 to 10 carbon atoms (a cyclopentyl group, a cyclohexyl group or a norbornyl group). As more preferred alkyl groups, there can be mentioned a 2-oxoalkyl group and an alkoxycarbonylmethyl group. As more preferred aliphatic hydrocarbon ring group, there can be mentioned a 2-oxoaliphatic hydrocarbon ring group.

The 2-oxoalkyl group may be linear or branched. A group having $>C=O$ at the 2-position of the alkyl group is preferred.

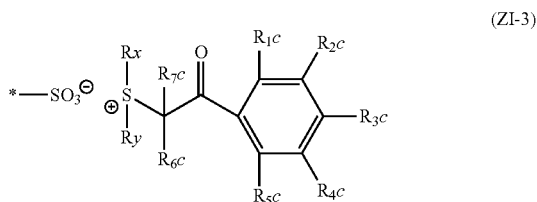
The 2-oxoaliphatic hydrocarbon ring group is preferably a group having $>C=O$ at the 2-position of the aliphatic hydrocarbon ring group.

As preferred alkoxy groups of the alkoxycarbonylmethyl group, there can be mentioned alkoxy groups having 1 to 5 carbon atoms (a methoxy group, an ethoxy group, a propoxy group, a butoxy group and a pentoxy group).

The R_{201} to R_{203} may be further substituted with a halogen atom, an alkoxy group (for example, 1 to 5 carbon atoms), a hydroxyl group, a cyano group or a nitro group.

Now, the compounds (ZI-3) will be described.

The compounds (ZI-3) are those represented by general formula (ZI-3), below, which have a phenacylsulfonium salt structure.



In general formula (ZI-3),

each of R_{1c} to R_{5c} independently represents a hydrogen atom, an alkyl group, a monovalent aliphatic hydrocarbon ring group, an alkoxy group or a halogen atom.

Each of R_{6c} and R_{7c} independently represents a hydrogen atom, an alkyl group or a monovalent aliphatic hydrocarbon ring group.

Each of R_x and R_y independently represents an alkyl group, a monovalent aliphatic hydrocarbon ring group, an allyl group or a vinyl group.

Any two or more of R_{1c} to R_{5c} , and R_{6c} and R_{7c} , and R_x and R_y may be bonded with each other to thereby form a ring structure. This ring structure may contain an oxygen atom, a sulfur atom, an ester bond or an amido bond. As the group formed by bonding of any two or more of R_{1c} to R_{5c} , and R_{6c} and R_{7c} , and R_x and R_y , there can be mentioned a butylene group, a pentylenegroup or the like.

The alkyl group represented by R_{1c} to R_{7c} may be linear or branched. As such, there can be mentioned, for example, an alkyl group having 1 to 20 carbon atoms, preferably a linear or branched alkyl group having 1 to 12 carbon atoms (for example, a methyl group, an ethyl group, a linear or branched propyl group, a linear or branched butyl group or a linear or branched pentyl group).

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As the monovalent aliphatic hydrocarbon ring group represented by R_{1c} to R_{7c} , there can be mentioned, for example, a monovalent aliphatic hydrocarbon ring group (monocyclic or polycyclic) having 3 to 8 carbon atoms (for example, a cyclopentyl group or a cyclohexyl group).

The alkoxy group represented by R_{1c} to R_{5c} may be linear, or branched, or cyclic. As such, there can be mentioned, for example, an alkoxy group having 1 to 10 carbon atoms, preferably a linear or branched alkoxy group having 1 to 5 carbon atoms (for example, a methoxy group, an ethoxy group, a linear or branched propoxy group, a linear or branched butoxy group or a linear or branched pentoxy group) and a cycloalkoxy group having 3 to 8 carbon atoms (for example, a cyclopentyloxy group or a cyclohexyloxy group).

Preferably, any one of R_{1c} to R_{5c} is a linear or branched alkyl group, a monovalent aliphatic hydrocarbon ring group or a linear, branched or cyclic alkoxy group. More preferably, the sum of carbon atoms of R_{1c} to R_{5c} is in the range of 2 to 15. Accordingly, there can be attained an enhancement of solvent solubility and inhibition of particle generation during storage.

As the alkyl groups and monovalent aliphatic hydrocarbon ring groups represented by R_x and R_y , there can be mentioned the same alkyl groups and monovalent aliphatic hydrocarbon ring groups as mentioned with respect to R_{1c} to R_{7c} . Among them, a 2-oxoalkyl group, a 2-oxoaliphatic hydrocarbon ring group and an alkoxycarbonylmethyl group are preferred.

As the 2-oxoalkyl group and 2-oxoaliphatic hydrocarbon ring group, there can be mentioned groups having $>C=O$ at the 2-position of the alkyl group and aliphatic hydrocarbon ring group represented by R_{1c} to R_{7c} .

Regarding the alkoxy group of the alkoxycarbonylmethyl group, there can be mentioned the same alkoxy groups as mentioned with respect to R_{1c} to R_{5c} .

Each of R_x and R_y is preferably an alkyl group or a monovalent aliphatic hydrocarbon ring group having preferably 4 or more carbon atoms. The alkyl group or monovalent aliphatic hydrocarbon ring group has more preferably 6 or more carbon atoms and still more preferably 8 or more carbon atoms.

Now, general formula (ZII) will be described.

In general formula (ZII), each of R_{204} and R_{205} independently represents an aryl group, an alkyl group or a monovalent aliphatic hydrocarbon ring group.

Particular examples of the aryl group, alkyl group and monovalent aliphatic hydrocarbon ring group represented by each of R_{204} and R_{205} are the same as mentioned above with respect to the groups (ZI-1).

Substituents may be introduced in the aryl group, alkyl group and monovalent aliphatic hydrocarbon ring group represented by each of R_{204} and R_{205} . As the substituents that may be introduced in the aryl group, alkyl group and monovalent aliphatic hydrocarbon ring group represented by each of R_{204} and R_{205} , there can be mentioned, for example, an alkyl group (for example, 1 to 15 carbon atoms), a monovalent aliphatic hydrocarbon ring group (for example, 3 to 15 carbon atoms), an aryl group (for example, 6 to 15 carbon atoms), an alkoxy group (for example, 1 to 15 carbon atoms), a halogen atom, a hydroxyl group, a phenylthio group and the like.

With respect to the polymerizable monomer units corresponding to the repeating units of general formula (I), examples of the sulfonate units generated by the cleavage of a cation upon exposure to actinic rays or radiation will be shown below.