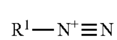
Examples of the organic onium ion (countercation) which is represented by M_1^+ and M_2^+ include onium ions such as iodonium, sulfonium, phosphonium, diazonium, ammonium, pyridinium, quinolinium, acridinium, oxonium, selenonium, and arsonium, among which onium ions such as iodonium, sulfonium, phosphonium, diazonium, quinolinium, and acridinium are preferable, and onium ions such as iodonium and sulfonium are even more preferable.

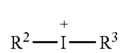
In addition, examples thereof include cations such as onium ions of onium salts of group 15 to 17 elements described in JP1994-184170A (JP-H06-184170A), and the like, diazonium ions of diazonium salts described in S. I. Schlesinger, Photogr. Sci. Eng., 18, 387 (1974), T. S. Bal et al., Polymer, 21, 423 (1980), and the like, ammonium ions of ammonium salts described in U.S. Pat. No. 4,069,055A, U.S. Pat. No. 4,069,056A, US RE27992E, JP1991-140140A (JP-H03-140140A), and the like, phosphonium ions of phosphonium salts described in D.C. Necker et al., Macromolecules, 17, 2468 (1984), C. S. Wen et al., Teh, Proc. Conf. Rad. Curing ASIA, p. 478 Tokyo, October (1988), U.S. Pat. No. 4,069,055A, U.S. Pat. No. 4,069,056A, JP1997-202873A (JP-H09-202873A), and the like, iodonium ions of iodonium salts described in J. V. Crivello et al., Macromolecules, 10 (6), 1307 (1977), Chem. & Eng. News, November 28, p. 31 (1988), EP104143B, EP339049B, EP410201B, JP1990-150848A (JP-H02-150848A), JP1990-296514A (JP-H02-296514A), and the like, sulfonium ions of sulfonium salts described in J. V. Crivello et al., Polymer J. 17, 73 (1985), J. V. Crivello et al., J. Org. Chem., 43, 3055 (1978), W. R. Watt et al., J. Polymer Sci., Polymer Chem. Ed., 22, 1789 (1984), J. V. Crivello et al., Polymer Bull., 14, 279 (1985), J. V. Crivello et al., Macromolecules, 14(5), 1141 (1981), J. V. Crivello et al., J. Polymer Sci., Polymer Chem. Ed., 17, 2877 (1979), EP370693B, EP161811B, EP410201B, EP339049B, EP233567B, EP297443B, EP297442B, U.S. Pat. No. 3,902,114A, U.S. Pat. No. 4,933,377A, U.S. Pat. No. 4,760,013A, U.S. Pat. No. 4,734,444A, U.S. Pat. No. 2,833,827A, DE2904626B, DE3604580B, DE3604581B, JP1995-28237A (JP-H07-28237A), JP1996-27102A (JP-H08-27102A), and the like, quinolinium ions of quinolinium salts described in JP1997-221652A (JP-H09-221652A) and the like, selenonium ions of selenonium salts described in J. V. Crivello et al., Macromolecules, 10 (6), 1307 (1977), J. V. Crivello et al., J. Polymer Sci., Polymer Chem. Ed., 17, 1047 (1979), and the like, and arsonium ions of arsonium salts described in C. S. Wen et al., Teh, Proc. Conf. Rad. Curing ASIA, p. 478 Tokyo, October (1988), and the like; however, the present invention is not limited thereto.

In addition, preferable examples of the countercation described above include cations having the structure represented by any one of Formulae (II) to (VII) below.

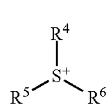
(II)



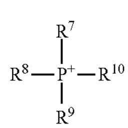
(III)



(IV)

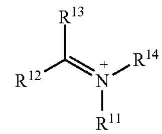


(V)

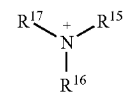


-continued

(VI)



(VII)



In Formulae (II) to (VII) above, R^1 to R^3 each independently represent an aryl group, R^4 to R^6 each independently represent an alkyl group, an alkenyl group, an alkynyl group, an aryl group, a cyclic hydrocarbon group, or a heterocyclic group, R^7 to R^{11} each independently represent an alkyl group, an alkenyl group, an alkynyl group, an aryl group, a cyclic hydrocarbon group, a heterocyclic group, an alkoxy group, or an aryloxy group, and R^{12} to R^{17} each independently represent a hydrogen atom, a halogen atom, or a monovalent organic group.

The alkyl groups denoted by R^4 to R^{11} preferably have 1 to 30 carbon atoms, more preferably 1 to 20 carbon atoms, and particularly preferably 1 to 8 carbon atoms, and may be straight-chain and may have a substituent group.

The alkenyl groups denoted by R^4 to R^{11} preferably have 2 to 30 carbon atoms, more preferably 2 to 20 carbon atoms, and particularly preferably 2 to 8 carbon atoms, and may further have a substituent group.

The alkynyl groups denoted by R^4 to R^{11} preferably have 2 to 30 carbon atoms, more preferably 2 to 20 carbon atoms, and particularly preferably 2 to 8 carbon atoms, and may further have a substituent group.

The aryl groups denoted by R^1 to R^{11} preferably have 6 to 30 carbon atoms, more preferably 6 to 20 carbon atoms, and particularly preferably 6 to 10 carbon atoms, and may further have a substituent group.

The cyclic hydrocarbon groups denoted by R^4 to R^{11} preferably have 3 to 30 carbon atoms, more preferably 3 to 20 carbon atoms, and particularly preferably 3 to 10 carbon atoms, and may further have a substituent group.

The heterocyclic groups denoted by R^4 to R^{11} preferably have 4 to 30 carbon atoms, more preferably 4 to 20 carbon atoms, and particularly preferably 4 to 10 carbon atoms, and may further have a substituent group. In addition, the hetero atom included in the heterocyclic group is preferably a nitrogen atom, an oxygen atom, or a sulfur atom.

The alkoxy groups denoted by R^7 to R^{11} preferably have 1 to 30 carbon atoms, more preferably 1 to 20 carbon atoms, and even more preferably 1 to 8 carbon atoms. In addition, the alkoxy groups may have a substituent group described below, and the alkyl moiety of the alkoxy groups may be an alkenyl group, an alkynyl group, a cyclic hydrocarbon group, or a heterocyclic group other than an aromatic group.

The aryloxy groups denoted by R^7 to R^{11} preferably have 6 to 30 carbon atoms, more preferably 6 to 20 carbon atoms, and even more preferably 6 to 10 carbon atoms. In addition, the aryloxy groups may have a substituent group described below, and the aryl moiety of the aryloxy groups may be an aromatic heterocyclic group.

In Formula (III), R^2 and R^3 may be bonded with each other to form a ring if this is possible.

In Formula (IV), two or more of R^4 to R^6 may be bonded with each other to form a ring if this is possible.