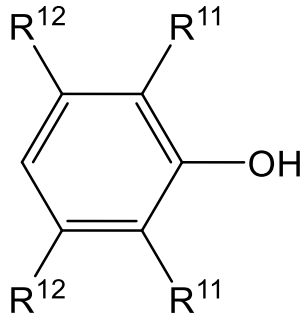
CLAIMS

[Claim 1] A polyphenylene ether comprising a repeating unit derived from a phenol of the following formula (1), a repeating unit derived from a phenol of the following formula (2), and a structural unit derived from a phenol of the following formula (3):

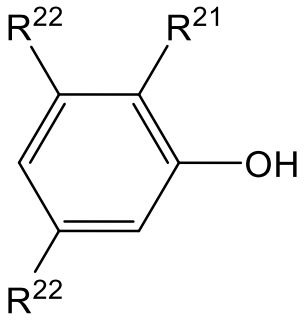
[Chem. 1]



Formula (1)

in the formula (1), each R^{11} is independently an optionally substituted saturated hydrocarbon group having a carbon number of 1 to 6, an optionally substituted aryl group having a carbon number of 6 to 12, or a halogen atom, and each R^{12} is independently a hydrogen atom, an optionally substituted hydrocarbon group having a carbon number of 1 to 6, an optionally substituted aryl group having a carbon number of 6 to 12, or a halogen atom:

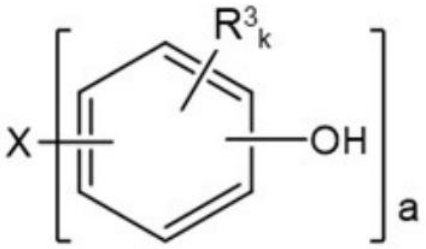
[Chem. 2]



Formula (2)

in the formula (2), each R^{22} is independently a hydrogen atom, an optionally substituted saturated or unsaturated hydrocarbon group having a carbon number of 1 to 20, an optionally substituted aryl group having a carbon number of 6 to 12, or a halogen atom, two R^{22} cannot be both hydrogen atoms, and R^{21} is a partial structure represented by the following formula (4):

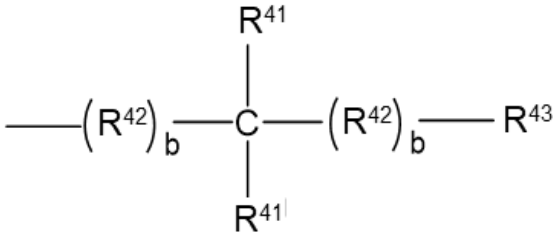
[Chem. 3]



Formula (3)

in the formula (3), X is any *a*-valent linking group, *a* is an integer from 2 to 6, R^3 is one of a linear alkyl group having a carbon number of 1 to 8 and a partial structure represented by the following formula (4), and is bonded to the carbon atom of at least one of Position 2 or Position 6 when the position of the carbon atom of the benzene ring to which -O- is bonded is designated as Position 1, and k is each independently an integer from 1 to 4:

[Chem. 4]



Formula (4)

in the formula (4), R^{41} is each independently an optionally substituted linear alkyl group having a carbon number of 1 to 8, or is a cyclic alkyl structure having a carbon number of 1 to 8 to which two R^{41} are bonded, each R^{42} is independently an optionally substituted alkylene group having a carbon number of 1 to 8, b is each independently 0 or 1, R^{43} is one of a hydrogen atom, an optionally substituted alkyl group having a carbon number of 1 to 8, or an optionally substituted phenyl group, and

the partial structure represented by the formula (4), which is R^{21} in the formula (2), and the partial structure represented by the formula (4) in R^{3} in the formula (3) may be the same or different.

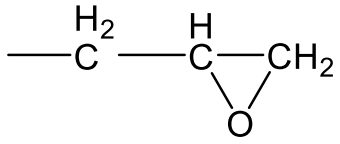
[Claim 2] The polyphenylene ether according to claim 1, wherein R^{21} is a t-butyl group in at least one repeating unit derived from the phenol of the formula (2).

[Claim 3] The polyphenylene ether according to claim 1 or 2, wherein at least one R^{3} in the formula (3) is a t-butyl group.

[Claim 4] The polyphenylene ether according to any one of claims 1 to 3,

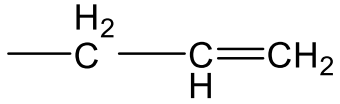
wherein the polyphenylene ether has at least one partial structure selected from the group consisting of the following formula (5), formula (6), formula (7), and formula (8):

[Chem. 5]



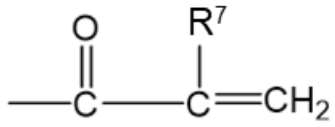
Formula (5)

[Chem. 6]



Formula (6)

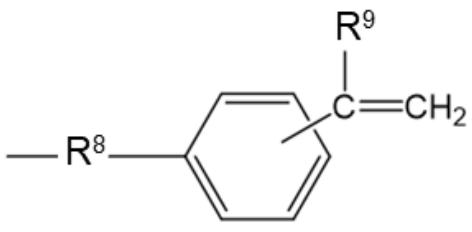
[Chem. 7]



Formula (7)

in the formula (7), R^7 is a hydrogen atom or a saturated or unsaturated hydrocarbon group having a carbon number of 1 to 10, the saturated or unsaturated hydrocarbon may have a substituent to the extent that the condition of the carbon number being 1 to 10 is satisfied:

[Chem. 8]



Formula (8)

in the formula (8), R^8 is a saturated or unsaturated divalent hydrocarbon group having a carbon number of 1 to 10, the saturated or unsaturated divalent hydrocarbon may have a substituent to the extent that the condition of the carbon number being 1 to 10 is satisfied, R^9 is a hydrogen atom or a saturated or unsaturated hydrocarbon group having a carbon number of 1 to 10, and the saturated or unsaturated hydrocarbon may have a substituent to the extent that the condition of the carbon number being 1 to 10 is satisfied.

[Claim 5] The polyphenylene ether according to any one of claims 1 to 4, wherein a number average molecular weight in terms of polystyrene is from 500 to 15,000.

[Claim 6] A production method of the polyphenylene ether according to any one of claims 1 to 5, comprising the step of performing oxidative polymerization of the phenol of the formula (1), the phenol of the formula (2), and the phenol of the formula (3).

[Claim 7] A thermosetting composition comprising the polyphenylene ether according to any one of claims 1 to 6.

[Claim 8] A prepreg, the prepreg being a composite comprising a base material and a thermosetting composition according to claim 7.

[Claim 9] The prepreg according to claim 8, wherein the base material is glass cloth.

[Claim 10] A laminate comprising a cured product of the prepreg according to claim 8 or 9 and a metal foil.