

Specification

Diamine derivative.

The Field of Technology

This invention relates to the following, namely, a novel compound which shows powerful anti-blood coagulating action by inhibiting activated blood coagulating factor X (hereinafter, abbreviated to FXa) with which oral administration is possible, too, a blood clotting suppressor or prevention and/or therapeutic agent of thrombus or embolus containing this as effective ingredient.

Background Technique

Because facilitation of blood clotting ability is one of important factor in unstable angina, cerebral infarction, cerebral embolism, cardiac infarction, pulmonary infarction, lung embolus, Buerger's disease, deep vein thrombosis, disseminated intravascular coagulation syndrome, thrombogenesis after synthetic valve replacement, restenosis after blood circulation reconstruction and thrombogenesis during extracorporeal circulation, or the like, and an anticoagulant having excellent dose response, durability, low risk of bleeding, low side effect and with which promptly sufficient effect can be obtained with oral administration is sought (Thrombosis Research, vol 68, pp 507-512, 1992).

From among studies of anticoagulants on the basis of various action mechanisms, an FXa inhibitor is suggested to have a potential to become excellent anticoagulant. The blood coagulation system is a series of reaction wherein large quantity of thrombin is produced via amplification process by multistage enzyme reactions and insoluble fibrin is formed. In the intrinsic system, the activation of contact factor is followed by multistage reactions, thereafter activated factor IX activates factor X on phospholipid membrane in the presence of activated factor VIII, calcium ion. Moreover, activated factor VII activates factor X in the presence of tissue factor in the extrinsic system. In other words, activation of factor X to FXa in coagulation system is an essential reaction in thrombin production. The factor X (FXa) activated in both systems restrictedly-decomposes prothrombin, and forms thrombin. As the formed thrombin activates coagulation factor of upstream, the production of thrombin is amplified further. Because the coagulation system of upstream than FXa differs in the intrinsic system and the extrinsic system as described above, when the coagulation system enzyme of upstream than FXa is inhibited, it

cannot adequately inhibit production of FXa and as a result thrombin is produced. Moreover, because the coagulation system is a self amplification reaction, the inhibition of coagulation system can be achieved with good efficiency by inhibition of FXa which is located in upstream than the inhibition of the formed thrombin (Thrombosis Research, vol 15, pp 617-629, 1979). Another excellent point of FXa inhibitor is a large discrepancy between the effective dose in thrombus model and the dose to cause prolonged bleeding time in experimental bleeding model, and it is considered that FXa inhibitor is anticoagulant of low risk of bleeding from this experimental result.

Various compounds are reported as FXa inhibitor, however, it is generally known that antithrombin III and antithrombin III dependent penta saccharide or the like, in practice, cannot hinder prothrombinase complex which plays a role in thrombogenesis in vivo (Thrombosis Research, vol 68, pp 507-512, 1992, Journal of Clinical Investigation, vol 171, pp 1383-1389, 1983. Mebio, vol 14, Aug , pp 92-97), and they do not demonstrate effectiveness by oral administration. Tick anticoagulant peptide (TAP) (Science, vol 248, pp 593-596, 1990) and antistacin (AST) isolated from mite and the leech which are a bloodsucker (Journal of Biological Chemistry, vol 263, pp 10162-10167, 1988) hinder FXa, too, and antithrombotic effect is demonstrated from venous blood clot model to arterial thrombotic model, but these are peptides of polymer and are ineffective with oral administration. In this way, development of FXa inhibitor of the low molecular form which directly hinders coagulation factor non-dependently to antithrombin III and which could be orally-administered has been carried out.

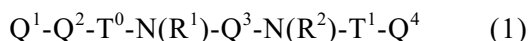
Accordingly, is had, and it is, and the object of this invention is to put forward novel compound having strong FXa inhibitory action, and promptly showing sufficient and sustained antithrombotic effect with oral administration.

Disclosure of the invention.

These inventors examined synthesis of novel FXa inhibitor and pharmacologic action, as a result discovered that diamine derivative, salts thereof, solventate thereof or the N-oxide thereof showed strong FXa inhibitory action and strong anticoagulation action. Moreover, these compounds strongly hindered FXa immediately and continuously with oral administration, and shows strong anticoagulation action and antithrombotic action, therefore these compounds are found to be useful as therapeutic drug

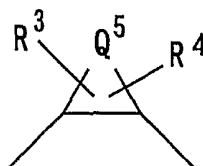
and prophylactic of various kinds of diseases based on thrombus / embolus. This invention was completed as a result of this discovery.

In other words, this invention puts forward a compound represented by general formula (1)



[wherein, R^1 and R^2 each independently denote hydrogen atom, hydroxy group, alkyl group or alkoxy group,

Q^1 denotes saturated or unsaturated 5-6 membered cyclic hydrocarbon group which may have substituent, saturated or unsaturated 5-7 membered heterocyclic group which may have substituent, saturated or unsaturated dicyclic or tricyclic condensed hydrocarbon group which may have substituent or saturated or unsaturated bicyclic or tricyclic condensed polycyclic group which may have substituent, Q^2 is a single bond, divalent saturated or unsaturated 5-6 membered cyclic hydrocarbon group which may have substituent, divalent saturated or unsaturated 5-7 membered heterocyclic group, divalent saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group which may have substituent or divalent saturated or unsaturated bicyclic or tricyclic condensed heterocyclic group which may have substituent, Q^3 denotes a following group



(in this group, Q^5 is 1-8 C alkylene group, 2-8 C alkenylene group or group $-(CH_2)_m-CH_2-A-CH_2-(CH_2)_n-$ (in this group, m and n each independently denote an integer of 0, 1-3, and A denotes oxygen atom, nitrogen atom, sulfur atom, $-SO-$, SO_2- , $-NH-$, $-O-NH-$, $-NH-NH-$, $-S-NH-$, $-SO-NH-$ or $-SO_2-NH-$),

R^3 and R^4 are substituted on carbon atom, nitrogen atom or sulphur atom on a ring including Q^5 and each independently denote hydrogen atom, hydroxy group, alkyl group, alkenyl group, alkynyl group, halogen atom, halogeno alkyl group, cyano group, cyano alkyl group, amino group, amino alkyl group, N-alkylamino alkyl group, N,N-dialkylaminoalkyl group, acyl group, acyl alkyl group, acylimino-group which may have substituent, alkoxyimino group, hydroxyimino group, acylamino alkyl group, alkoxy group, alkoxyalkyl group, hydroxyalkyl group, carboxyl group, carboxyalkyl group, alkoxy carbonyl group, alkoxy carbonyl alkyl group, alkoxy carbonyl alkylamino group, carboxyalkyl amino group, alkoxy carbonylamino group, alkoxy carbonylamino alkyl group, carbamoyl group, N-alkylcarbamoyl group which may have substituent on alkyl group, N,N-dialkyl carbamoyl group which may have

substituent on alkyl group, N-alkenyl carbamoyl group, N-alkenyl carbamoyl alkyl group, N-alkenyl-N-alkylcarbamoyl group, N-alkenyl-N-alkylcarbamoyl alkyl group, N-alkoxy carbamoyl group, N-alkyl-N-alkoxy carbamoyl group, N-alkoxy carbamoyl alkyl group, N-alkyl-N-alkoxy carbamoyl alkyl group, carbazoyl group optionally-substituted by 1-3 alkyl group, alkylsulfonyl group, alkylsulfonyl alkyl group, 3-6 membered heterocyclic carbonyl group which may have substituent, carbamoyl alkyl group, N-alkylcarbamoyl alkyl group which may have substituent on alkyl group, N,N-dialkyl carbamoyl alkyl group which may have substituent on alkyl group, carbamoyloxy alkyl group, N-alkylcarbamoyl oxy alkyl group, N,N-dialkyl carbamoyloxy alkyl group, 3-6 membered heterocyclic carbonyl alkyl group which may have substituent, 3-6 membered heterocyclic carbonyl oxy alkyl group which may have substituent, aryl group, aralkyl group, heteroaryl group, heteroaryl alkyl group, alkylsulfonyl amino group, arylsulfonylamino group, alkylsulfonyl amino alkyl group, arylsulfonylamino alkyl group, alkylsulfonyl aminocarbonyl group, arylsulfonylamino carbonyl group, alkylsulfonyl aminocarbonyl alkyl group, arylsulfonylamino carbonyl alkyl group, oxo group, carbamoyloxy group, aralkyloxy group, carboxyalkyl oxy group, acyl oxy group, acyloxyalkyl group, aryl sulphonyl group, alkoxy carbonyl alkylsulfonyl group, carboxyalkyl sulphonyl group, alkoxy carbonyl acyl group, alkoxyalkyl oxycarbonyl group, hydroxy acyl group, alkoxy acyl group, halogeno acyl group, carboxy acyl group, aminoacyl group, acyloxyacyl group, acyloxyalkyl sulphonyl group, hydroxyalkyl sulphonyl group, alkoxyalkyl sulphonyl group, 3-6 membered heterocyclic sulphonyl group which may have substituent, N-alkylamino acyl group, N,N-dialkylamino acyl group, N,N-dialkyl carbamoyl acyl group which may have substituent on alkyl group, N,N-dialkyl carbamoyl alkylsulfonyl group which may have substituent on alkyl group or alkylsulfonyl acyl group, or R³ and R⁴ are bonded together and denote 1-5 C alkylene group, 2-5 C alkenylene group, 1-5 C alkylene dihydroxy group or carbonyldioxy group), Q⁴ denotes aryl group which may have substituent, aryl alkenyl group which may have substituent, aryl alkynyl group which may have substituent, heteroaryl group which may have substituent, heteroaryl alkenyl group which may have substituent, saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group which may have substituent, saturated or unsaturated bicyclic or tricyclic condensed heterocyclic group which may have substituent, T⁰ denotes carbonyl group or thiocarbonyl group, T¹ denotes carbonyl group, sulphonyl group, group -C(=O)-C(=O)-N(R¹)-, group -C(=S)-C(=O)-N(R')-, group -C(=O)-C(=S)-N(R')-, group -C(=S)-C(=S)-N(R')- (in this group, R¹ denotes hydrogen atom, hydroxy group, alkyl group or alkoxy group), group -C(=O)-A¹-N(R'')- (in this group, A¹ denotes 1-5 C alkylene group which may have substituent, and R'' denotes hydrogen atom, hydroxy group, alkyl group

or alkoxy group), group -C(=O)-NH-, group -C(=S)-NH-, group -C(=O)-NH-NH-, group -C(=O)-A²-C(=O)- (in this group, A² denotes single bond or 1-5 C alkylene group), group -C(=O)-A³-C(=O)-NH- (in this group, A³ denotes 1-5 C alkylene group), group -C(=O)-C (NOR^a)-N(R^b)-, group -C(=S)-C (NOR^a)-N(R^b)- (in this group, R^a denotes hydrogen atom, alkyl group or alkanoyl group, and R^b denotes hydrogen atom, hydroxy group, alkyl group or alkoxy group), group -C(=O)-N=N-, group -C(=S)-N=N- or thiocarbonyl group], and salts thereof, solventate thereof or N-oxide thereof.

Moreover, this invention puts forward a drug containing compound, salts thereof, solventate thereof or N-oxide thereof represented by aforesaid general formula (1), or an activated blood coagulating factor X inhibitor, a blood clotting suppressor, a prevention and/or therapeutic agent of thrombus or embolus, a prevention and/or therapeutic agent of cerebral infarction, cerebral embolism, cardiac infarction, angina, pulmonary infarction, lung embolus, Buerger's disease, deep vein thrombosis, disseminated intravascular coagulation syndrome, thrombogenesis after synthetic valve / articulation replacement, thrombogenesis and restenosis after blood circulation reconstruction, systemic inflammatory reaction syndrome (SIRS), multiple organ dysfunction (MODS), thrombogenesis during extracorporeal circulation or blood clotting during blood collection.

Moreover, this invention puts forward intermediate to produce compound (1) represented by aforesaid general formula (1).

Moreover, this invention puts forward use for drug production of compound, salts thereof, solventate thereof or N-oxide thereof represented by aforesaid general formula (1).

This invention further puts forward treatment process of thrombus or embolus to be characterised in that effective dose of compound, salts thereof, solventate thereof or N-oxide thereof represented by the aforesaid general formula (1) is administered.

Ideal form for Carrying Out the Invention

Below substituent is explained in diamine derivative of this invention represented by general formula (1).

< About group Q⁴. >

Q⁴ denotes aryl group which may have substituent, aryl alkenyl group which may have substituent, aryl alkynyl group which may have substituent, heteroaryl group which may have substituent, heteroaryl alkenyl group which may have substituent, saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group which may have substituent, saturated or unsaturated bicyclic or tricyclic condensed heterocyclic group which may have substituent. .

In group Q⁴, as aryl group, 6-14 C aryl groups, for example phenyl group, naphthyl group, anthryl group, phenanthryl group and the like are nominated. As far as aryl alkenyl group is concerned, a group constructed with 6-14 C aryl group and 2-6C alkenylene group is denoted, and for example styryl group and the like are nominated. As far as aryl alkynyl group is concerned, a group constructed with 6-14C aryl group and 2-6C alkynylene group is denoted, and for example phenylethynyl group and the like are nominated.

Heteroaryl group denotes monovalent group of aromaticity to contain heteroatom of at least 1 selected from oxygen atom, sulfur atom and nitrogen atom, and heteroaryl groups of total number of members comprising 5 or 6, for example pyridyl group, pyridazinyl group, furyl group, thienyl group, pyrrolyl group, thiazolyl group, oxazolyl group, pyrimidinyl group, tetrazolyl group and the like are nominated. Heteroaryl alkenyl group denotes a group constructed with aforesaid heteroaryl group and 2-6C alkenylene group, and for example thienyl ethenyl group, pyridyl ethenyl group and the like are nominated.

Saturated or unsaturated bi or tricyclic condensed hydrocarbon group denotes the one in which saturated or unsaturated bi or tricyclic condensed hydrocarbon becomes monovalent group, and saturated or unsaturated bi or tricyclic condensed hydrocarbon thereof denotes di or tricyclic condensed hydrocarbon which is formed by condensation of two or three saturated or unsaturated 5-6 membered cyclic hydrocarbons of the same species or different species. As saturated or unsaturated 5-6 membered cyclic hydrocarbon in this case, for example, cyclopentane, cyclopentene, cyclohexane, cyclohexene, cyclohexadiene, benzene and the like are nominated. As embodiment example of saturated or unsaturated bi or tricyclic condensed hydrocarbon group, indenyl group, indanyl group, tetrahydro naphthyl group, naphthyl group and the like are nominated. Moreover the position at which saturated or unsaturated bi

or tricyclic condensed hydrocarbon group is bonded with T¹ in general formula (1) is not restricted in particular.

As saturated or unsaturated bi or tricyclic condensed heterocyclic group denotes the one in which saturated or unsaturated bi or tricyclic condensed heterocycle becomes monovalent group, and saturated or unsaturated bi or tricyclic condensed heterocyclic group denotes following (1)-(3).

- (1). A bi or tricyclic condensed heterocyclic group which is formed by condensation of two or three saturated or unsaturated 5-7 membered heterocycle of the same species or different species.
- (2). a bi or tricyclic condensed heterocyclic group which is formed by condensation of one saturated or unsaturated 5-7 membered heterocycle and one or two saturated or unsaturated 5-6 membered cyclic hydrocarbons, and (3) a bi or tricyclic condensed heterocyclic group which is formed by condensation of two saturated or unsaturated 5-7 membered heterocycle and one saturated or unsaturated 5-6 membered cyclic hydrocarbon.

The position at which aforesaid saturated or unsaturated bicyclic or tricyclic condensed polycyclic group is bonded with T¹ in general formula (1) is not restricted in particular.

Aforesaid saturated or unsaturated 5-7 membered heterocycle denotes heterocycle containing heteroatom of at least 1 selected from oxygen atom, sulfur atom and nitrogen atom, and furan, pyrrole, thiophene, pyrazole, imidazole, oxazole, oxazolidine, thiazole, thiadiazole, furazane, pyran, pyridine, pyrimidine, pyridazine, pyrrolidine, piperazine, piperidine, oxazine, oxadi azine, morpholine, thiazine, thiadiazine, thiomorpholine, tetrazole, triazole, triazine, thiadiazine, oxadi azine, azepin, diazepine, triazepine, thiazepine, oxazepine and the like can be nominated as embodiment. Moreover, saturated or unsaturated 5-6 membered cyclic hydrocarbon denotes the same one as saturated or unsaturated 5-6 membered cyclic hydrocarbon exemplified in explanation of the saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group .

As embodiment of condensed polycyclic group having saturated or unsaturated bicyclic or tricyclic characteristics benzofuryl group, iso benzofuryl group, benzothienyl group, indolyl group, indolinyl group, iso indolyl group, iso indolinyl group, indazolyl group, quinolyl group, dihydro quinolyl group, 4-

oxo-dihydro quinolyl group (dihydro quinolin-4-one), tetrahydro quinolyl group, isoquinolyl group, tetrahydro isoquinolyl group, chromenyl group, chromanyl group, in chromanyl group, 4H-4-oxo benzopyranyl group, 3,4-dihydro-4H-4-oxo benzopyranyl group, 4H-quinolidinyl group, quinazolinyl group, dihydro quinazolinyl group, tetrahydroquinazolinyl group, quinoxalinyl group, tetrahydro quinoxalinyl group, cinnolinyl group, tetrahydro cinnonyl group, indolizinyl group, tetrahydro indolizinyl group, benzothiazolyl group, tetrahydrobenzo thiazolyl group, benzoxazolyl group, benzo iso thiazolyl group, benzo isoxazolyl group, benzimidazolyl group, naphthyridinyl group, tetrahydro naphthyridinyl group, thieno pyridyl group, tetrahydrothieno pyridyl group, thiazolo pyridyl group, tetrahydro thiazolo pyridyl group, thiazolo pyridazinyl group, tetrahydro thiazolo pyridazinyl group, pyrrolo pyridyl group, dihydropyrrolo pyridyl group, tetrahydropyrrolo pyridyl group, pyrrolo pyrimidinyl group, dihydropyrrolo pyrimidinyl group, pyrido quinazolinyl group, dihydropyrido quinazolinyl group, pyrido pyrimidinyl group, tetrahydropyrido pyrimidinyl group, pyrano thiazolyl group, dihydropyrano thiazolyl group, furo pyridyl group, tetrahydrofuro pyridyl group, oxazolo pyridyl group, tetrahydro oxazolo pyridyl group, oxazolo pyridazinyl group, tetrahydro oxazolo pyridazinyl group, pyrrolo thiazolyl group, dihydropyrrolo thiazolyl group, pyrrolo oxazolyl group, dihydropyrrolo oxazolyl group, thieno pyrrolyl group, thiazolo pyrimidinyl group, 4-oxo-tetrahydro cinnolinyl group, 1,2,4-benzo thiadiazinyl group, 1,1-dihydroxy-2H-1,2,4-benzo thiadiazinyl group, 1,2,4-benzoxadiazinyl group, cyclopenta pyranyl group, thieno furanyl group, furo pyranyl group, pyrido oxazinyl group, pyrazolo oxazolyl group, imidazo thiazolyl group, imidazo pyridyl group, tetrahydroimidazo pyridyl group, pyrazino pyridazinyl group, benz isoquinolyl group, furo cinnolyl group, pyrazolo thiazolo pyridazinyl group, tetrahydropyrazolo thiazolo pyridazinyl group, hexahydro thiazolo pyridazino pyridazinyl group, imidazo triazinyl group, oxazolo pyridyl group, benzoxazepinyl group, benzo azepinyl group, tetrahydrobenzo azepinyl group, benzo di azepinyl group, benzo tri azepinyl group, thieno azepinyl group, tetrahydrothieno azepinyl group, thieno di azepinyl group, thieno tri azepinyl group, thiazolo azepinyl group, tetrahydro thiazolo azepinyl group, 4,5,6,7-tetrahydro-5,6-tetramethylene thiazolo pyridazinyl group, 5,6-trimethylene-4,5,6,7-tetrahydro thiazolo pyridazinyl group and the like are nominated.

The condensation form of aforesaid condensed polycyclic group is not limited in particular, and for example, as far as naphthyridinyl group is concerned, 1,5-, 1,6-, 1,7-, 1,8-, 2,6- or 2,7-naphthyridinyl group may be used, and as far as thieno pyridyl group is concerned, thieno [2,3-b] pyridyl group, thieno

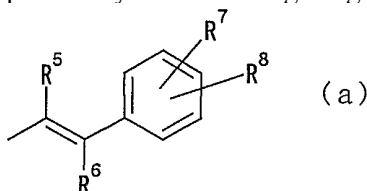
[2,3-c] pyridyl group, thieno [3,2-b] pyridyl group, thieno [3,2-c] pyridyl group, thieno [3,4-b] pyridyl group, thieno [3,4-c] pyridyl group may be used, as far as thieno pyrrolyl group is concerned, thieno [2,3-b] pyrrolyl group, thieno [2,3-b] pyrrolyl group and the like may be used. As far as thiazolo pyridyl group is concerned, thiazolo [4,5-b] pyridyl group, thiazolo [4,5-c] pyridyl group, thiazolo [5,4-b] pyridyl group, thiazolo [5,4-c] pyridyl group, thiazolo [3,4-a] pyridyl group, thiazolo [3,2-a] pyridyl group may be used, as far as thiazolo pyridazinyl group is concerned, thiazolo [4,5-c] pyridazinyl group, thiazolo [4,5-d] pyridazinyl group, thiazolo [5,4-c] pyridazinyl group, thiazolo [3,2-b] pyridazinyl group may be used, as far as pyrrolo pyridyl group is concerned, pyrrolo [2,3-b] pyridyl group, pyrrolo [2,3-c] pyridyl group, pyrrolo [3,2-b] pyridyl group, pyrrolo [3,2-c] pyridyl group, pyrrolo [3,4-b] pyridyl group, pyrrolo [3,4-c] pyridyl group may be used, as far as pyrido pyrimidinyl group is concerned, pyrido [2,3-d] pyrimidinyl group, pyrido [3,2-d] pyrimidinyl group, pyrido [3,4-d] pyrimidinyl group, pyrido [4,3-d] pyrimidinyl group, pyrido [1,2-c] pyrimidinyl group, pyrido [1,2-a] pyrimidinyl group may be used, as far as pyrano thiazolyl group is concerned, pyrano [2,3-d] thiazolyl group, pyrano [4,3-d] thiazolyl group, pyrano [3,4-d] thiazolyl group, pyrano [3,2-d] thiazolyl group may be used, as far as furo pyridyl group is concerned, furo [2,3-b] pyridyl group, furo [2,3-c] pyridyl group, furo [3,2-b] pyridyl group, furo [3,2-c] pyridyl group, furo [3,4-b] pyridyl group, furo [3,4-c] pyridyl group may be used, as far as oxazolo pyridyl group is concerned, oxazolo [4,5-b] pyridyl group, oxazolo [4,5-c] pyridyl group, oxazolo [5,4-b] pyridyl group, oxazolo [5,4-c] pyridyl group, oxazolo [3,4-a] pyridyl group, oxazolo [3,2-a] pyridyl group may be used, as far as oxazolo pyridazinyl group is concerned, oxazolo [4,5-c] pyridazinyl group, oxazolo [4,5-d] pyridazinyl group, oxazolo [5,4-c] pyridazinyl group, oxazolo [3,4-b] pyridazinyl group may be used, as far as pyrrolo thiazolyl group is concerned, pyrrolo [2,1-b] thiazolyl group, pyrrolo [1,2-c] thiazolyl group, pyrrolo [2,3-d] thiazolyl group, pyrrolo [3,2-d] thiazolyl group, pyrrolo [3,4-d] thiazolyl group may be used, as far as pyrrolo oxazolyl group is concerned, pyrrolo [2,1-b] oxazolyl group, pyrrolo [1,2-c] oxazolyl group, pyrrolo [2,3-d] oxazolyl group, pyrrolo [3,2Hd] oxazolyl group, pyrrolo [3,4-d] oxazolyl group may be used, as far as benzo azepinyl group is concerned, 1H-1-benzo azepinyl group, 1H-2-benzo azepinyl group, 1H-3-benzo azepinyl group may be used, and moreover even benzo azepinyl group of dihydro oxo derivative type such as 4,5-dihydro-1-oxo-1H-2-benzo azepinyl group may be used. As far as benzo di azepinyl group is concerned, 1H-1,3-benzo di azepinyl group, 1H-1,4-benzo di azepinyl group, 1H-1,5-benzo di azepinyl group may be used, and also even benzo di azepinyl group of dihydro oxo derivative type such as 4,5-dihydro-4-oxo-1H-1,3-benzo di azepinyl group may be used. As far as benzo tri azepinyl group is

concerned, 1H-1,3,4-benzo tri azepinyl group, 1H-1,3,5-benzo tri azepinyl group may be used, and also even benzo tri azepinyl group of dihydro oxo derivative type such as 4,5-dihydro-5-oxo-1H-1,3,4-benzo tri azepinyl group may be used. As far as thieno azepinyl group is concerned, thieno [2,3-b] azepinyl group, thieno [2,3-c] azepinyl group, thieno [2,3-d] azepinyl group, thieno [3,2-c] azepinyl group, thieno [3,2-b] azepinyl group may be used, moreover thieno azepinyl group of dihydro oxo derivative type such as 5,6,7,8-tetrahydro-4-oxo-4H-thieno [3,2-c] azepinyl group may be used, in the same way, any one of condensation form may be used in thieno di azepinyl group and thieno tri azepinyl group, and moreover one of dihydro oxo derivative type may be used, and as far as benzothiazepinyl group is concerned, 1H-1- benzothiazepinyl group, 1H-2- benzothiazepinyl group, 1H-3- benzothiazepinyl group may be used, and moreover benzothiazepinyl group of dihydro oxo derivative type such as 4,5-dihydro-1-oxo-1H-2-benzothiazepinyl group may be used, as far as benzoxazepinyl group is concerned, 1H-1-benzoxazepinyl group, 1H-2-benzoxazepinyl group, 1H-3-benzoxazepinyl group may be used, and moreover benzoxazepinyl group of dihydro oxo derivative type such as 4,5-dihydro-1-oxo-1H-2-benzoxazepinyl groups may be used, and moreover, the one other than these fused forms may be used.

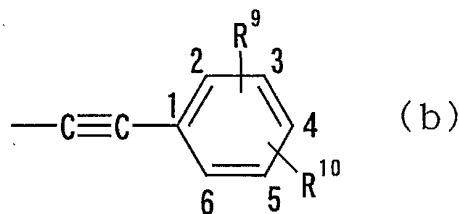
Aforesaid aryl group, heteroaryl group, aryl alkenyl group, heteroaryl alkenyl group, saturated or unsaturated condensed hydrocarbon group and saturated or unsaturated bicyclic or tricyclic condensed heterocyclic group may respectively contain 1-3 substituents, and as substituents, hydroxy group, halogen atom such as fluorine atom, chlorine atom, bromine atom, iodine atom, carbon number 1-6 halogeno alkyl group in which 1-3 halogen atoms are substituted, amino group, cyano group, amino alkyl group, nitro group, hydroxyalkyl group (for example hydroxymethyl group, 2- hydroxyethyl group or the like), alkoxyalkyl group (for example methoxymethyl group, 2- methoxyethyl group or the like), carboxyl group, the carboxyalkyl group (for example carboxymethyl group, 2- carboxyethyl group or the like), alkoxy carbonyl alkyl group (for example methoxycarbonylmethyl group, ethoxycarbonylmethyl group or the like), acyl group (alkanoyl group such as for example formyl group, acetyl group, propionyl group or the like), amidino group, hydroxy amidino group, straight, branched or cyclic 1-6C alkyl group (for example methyl group, ethyl group or the like), straight, branched or cyclic 1-6C alkoxy group (for example methoxy group, ethoxy group or the like), anamidino group substituted with straight, branched or cyclic 2-7C alkoxy carbonyl group (for example methoxycarbonyl amidino group, ethoxycarbonyl amidino group or the like), straight, branched or cyclic 2-6C alkenyl group (for example vinyl group,

allyl group or the like), straight or branched chain 2-6C alkynyl group (for example ethynyl group, propynyl group or the like), mono or dialkylamino group (for example ethylamino group, dimethylamino function, methylethylamino group) and 5-6 membered nitrogen containing heterocyclic groups substituted by straight, branched or cyclic 2-6C alkoxy carbonyl group (for example methoxycarbonyl group, ethoxycarbonyl group or the like), carbamoyl group, mono or dialkyl carbamoyl group which straight, branched or cyclic 1-6C alkyl group on nitrogen atom substituted, straight, branched or cyclic 1-6C alkyl group (for example pyrrolidino group, piperidino group, piperazino group, morpholino group or the like) are nominated.

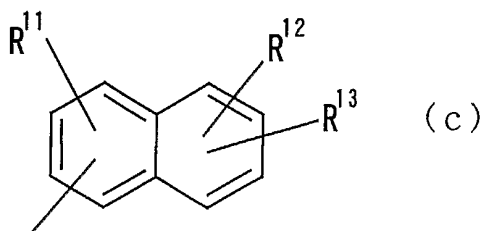
Among aforesaid groups, group Q⁴ is preferably the following 12 groups (a)-(l), in other words,



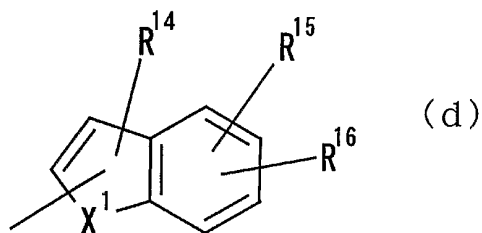
(in this group, R⁵ and R⁶ each independently denote hydrogen atom, cyano group, halogen atom, alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, alkoxy carbonyl group, alkoxy carbonyl alkyl group or phenyl group which may be substituted by cyano group, hydroxy group, halogen atom, alkyl group or alkoxy group. R⁷ and R⁸ each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkyl carbamoyl group, N,N-dialkyl carbamoyl group, alkoxy carbonyl group, amidino group or alkoxy carbonyl alkyl group),



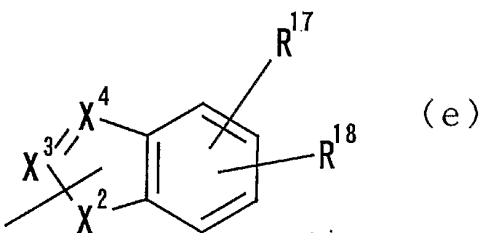
(in this group, R⁹ and R¹⁰ each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkyl carbamoyl group, N,N-dialkyl carbamoyl group, alkoxy carbonyl group, amidino group or alkoxy carbonyl alkyl group),



(in this group, R^{11} , R^{12} and R^{13} each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkoxy-carbonyl group, amidino group or alkoxy-carbonyl alkyl group),

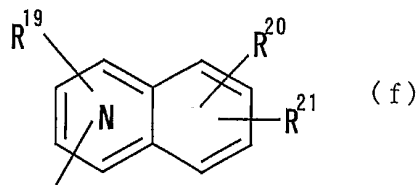


(in this group, X^1 denotes CH_2 , CH , NH , NOH , N , O or S , and R^{14} , R^{15} and R^{16} each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkoxy-carbonyl group, amidino group or alkoxy-carbonyl alkyl group),

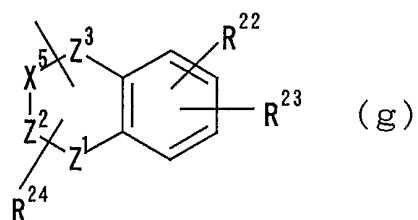


(in this group, X^2 denotes NH , N , O or S , X^3 denotes N , C or CH , X^4 denotes N , C or CH , and R^{17} and R^{18} each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkoxy-carbonyl group, amidino group or

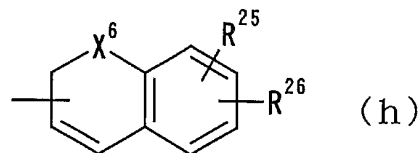
alkoxycarbonyl alkyl group. Wherein the case that X^3 and X^4 are the combination of C and CH or are both C or CH is excluded),



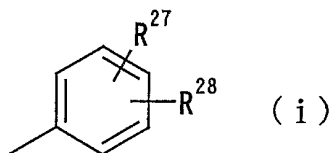
(in this group, N denotes that 1 or 2 of carbon atom of a ring in which R^{19} is substituted is substituted with nitrogen atom, and R^{19} , R^{20} and R^{21} each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkoxy carbonyl group, amidino group or alkoxy carbonyl alkyl group),



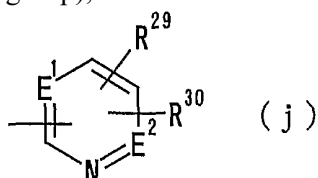
(in this group, X^5 denotes CH_2 , CH, N or NH, Z^1 denotes N, NH or O, Z^2 denotes CH_2 , CH, C or N, Z^3 denotes CH_2 , CH, S, SO_2 or $C=O$, X^5-Z^2 denotes that X^5 and Z^2 are bonded with single bond or double bond, R^{22} and R^{23} each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkoxy carbonyl group, amidino group or alkoxy carbonyl alkyl group, and R^{24} denotes hydrogen atom or alkyl group),



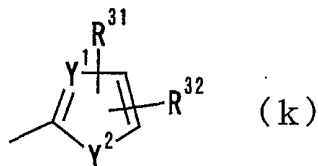
(in this group, X^6 denotes O or S, and R^{25} and R^{26} each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkoxy carbonyl group, amidino group or alkoxy carbonyl alkyl group),



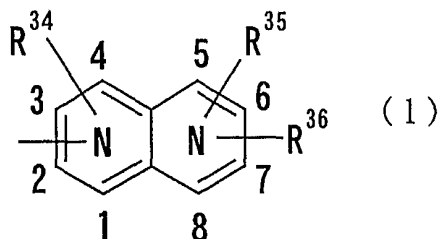
(in this group, R^{27} and R^{28} each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkoxy-carbonyl group, amidino group or alkoxy-carbonyl alkyl group),



(in this group, E^1 and E^2 each independently denote N or CH, and R^{29} and R^{30} each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkoxy-carbonyl group, amidino group or alkoxy-carbonyl alkyl group),



(in this group, Y^1 denotes CH or N, Y^2 denotes N(R^{33})-(in this group, R^{33} denotes hydrogen atom or 1-6 C alkyl group), O or S, and R^{31} and R^{32} each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkoxy-carbonyl group, amidino group or alkoxy-carbonyl alkyl group) and



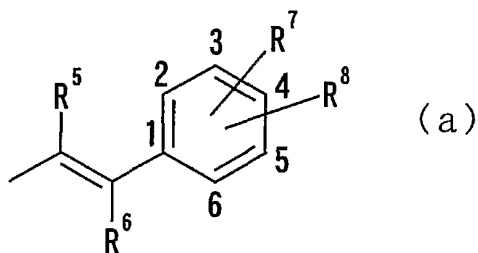
(in this group, the numbers 1-8 denote positions, each N denotes that any one of carbon atom at 1-4 and any one of carbon atom at 5-8 is respectively substituted by one nitrogen atom, R³⁴, R³⁵ and R³⁶ each independently denote hydrogen atom, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkoxy carbonyl group, amidino group or alkoxy carbonyl alkyl group) are nominated as preferred groups.

Below these groups are explained.

In explanation of R⁵-R³⁶ in aforesaid group, halogen atom denotes a fluorine atom, chlorine atom, bromine atom or iodine atom, alkyl group denotes straight chain, branched or cyclic group of carbon number 1-6, alkenyl group denotes straight chain, branched or cyclic group of carbon number 2-6, alkynyl group denotes straight or branched chain group of carbon number 2-6, hydroxyalkyl group denotes a group in which one hydroxy group is substituted on aforesaid C¹-C⁶ alkyl group, alkoxy group denotes straight chain, branched or cyclic group of carbon number 1-6, alkoxyalkyl group denotes a group in which one of aforesaid C¹-C⁶ alkoxy group is substituted on aforesaid C¹-C⁶ alkyl group, carboxyalkyl group denotes a group in which one carboxyl group is substituted on aforesaid C¹-C⁶ alkyl group, acyl group denotes aryl alkanoyl group in which aforesaid C⁶-C¹⁴ aryl group is substituted on 1-6 C alkanoyl group (including formyl), aroyl group such as benzoyl group, naphthoyl group and the like or aforesaid C¹-C⁶ alkanoyl group, N-alkylcarbamoyl group denotes carbamoyl group in which aforesaid C¹-C⁶ alkyl group is substituted on nitrogen atom, N,N-dialkyl carbamoyl group denotes carbamoyl group in which aforesaid C¹-C⁶ alkyl group is substituted for 2 on nitrogen atom, alkoxy carbonyl group denotes a group comprising aforesaid C¹-C⁶ alkoxy group and carbonyl group, alkoxy carbonyl alkyl group denotes a group in which one of aforesaid C¹-C⁶ alkoxy carbonyl group is substituted on aforesaid C¹-C⁶ alkyl group and halogeno alkyl group denotes a group in which halogen atom of 1-3 is substituted

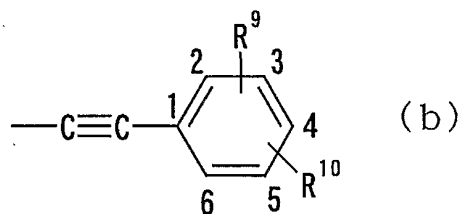
on aforesaid C¹-C⁶ alkyl group. Moreover, in aforesaid explanation, site of substitution is not restricted in particular.

In following group



(in this group, R⁵, R⁶, R⁷ and R⁸ have the same aforesaid meanings, and the numbers 1-6 denote positions), R⁵ and R⁶ each independently preferably-denote a hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group. As R⁵ and R⁶, hydrogen atom or alkyl group is more preferred, and methyl group is preferred in the case of alkyl group. Moreover, as R⁷ and R⁸, it is preferred the case that one of them is hydrogen atom and the other is hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group, and the case that the other is hydrogen atom, halogen atom, alkyl group or alkynyl group is particularly preferred. As halogen atom in this case, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkynyl group, ethynyl group is particularly preferred. As embodiment group represented by aforesaid formula, chloro styryl group, fluoro styryl group, bromo styryl group, ethynyl styryl group can be nominated as preferred example, and the position in which halogen atom, alkyl group or alkynyl group is substituted in their group should not be restricted in particular, however, 4 position in aforesaid formula is particularly preferred. As embodiments, 4-chloro styryl group, 4-fluoro styryl group, 4-bromo styryl group, 4-ethynyl styryl group can be nominated as preferred example.

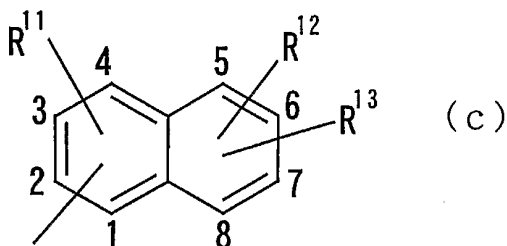
In the following group



(in this group, R⁹ and R¹⁰ have the same aforesaid meanings, and the numbers 1-6 denote positions), R⁹ and R¹⁰ each independently preferably-denote a hydrogen atom, halogen atom, alkyl group or alkynyl

group. Moreover, the case of R^9 is hydrogen atom and R^{10} is hydrogen atom, halogen atom, alkyl group or alkynyl group is preferred. As halogen atom in this case, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkyl group, ethynyl group is particularly preferred. As embodiment group represented by aforesaid formula, chlorophenyl-ethynyl group, fluorophenyl-ethynyl group, bromo phenyl-ethynyl group, ethynyl phenyl-ethynyl group can be nominated as preferred example, and the position in which halogen atom, alkyl group or alkynyl group is substituted in their group should not be restricted in particular, however, 4 position in aforesaid formula is particularly preferred. As embodiments, 4-chlorophenyl-ethynyl group, 4-fluorophenyl-ethynyl group, 4-bromo phenyl-ethynyl group, 4-ethynyl phenyl-ethynyl group can be nominated as preferred example.

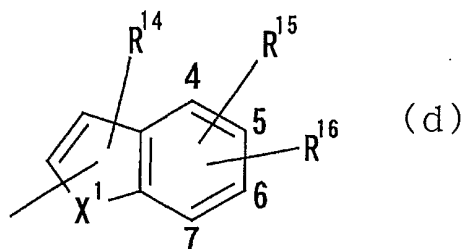
In the following group



(in this group, R^{11} , R^{12} and R^{13} have the same aforesaid meanings, and the numbers 1-8 denote positions), R^{11} , R^{12} and R^{13} each independently preferably denote a hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group. As R^{11} , hydrogen atom, alkyl group, halogen atom and hydroxy group are preferred, and hydrogen atom in particular is preferred. As R^{12} and R^{13} , it is preferred the case that one of them is hydrogen atom and the other is hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group, and the case that the other is hydrogen atom, halogen atom, alkyl group or alkynyl group is particularly preferred. As halogen atom in this case, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkynyl group, ethynyl group is preferred. As aforesaid naphthyl group, 2-naphthyl group is preferred than 1-naphthyl group, and in case of 2-naphthyl group, it should not be restricted in particular as the position which halogen atom, alkyl group or alkynyl group is substituted, however, 6-position or 7-position in aforesaid formula is preferred, and 6-position is most preferred. Moreover, a group in which chlorine atom, fluorine atom, bromine atom, alkynyl group or the like is substituted in these naphthyl groups is more preferred, furthermore, a group in which chlorine atom, fluorine atom, bromine atom, alkynyl group or the like is substituted is particularly preferred. As embodiments, 6-chloro-2-naphthyl group, 6-fluoro-2-naphthyl group, 6-

bromo-2-naphthyl group, 6-ethinyl-2-naphthyl group, 7-chloro-2-naphthyl group, 7-fluoro-2-naphthyl group, 7-bromo-2-naphthyl group, 7-ethinyl-2-naphthyl group can be nominated as preferred example.

In the following group

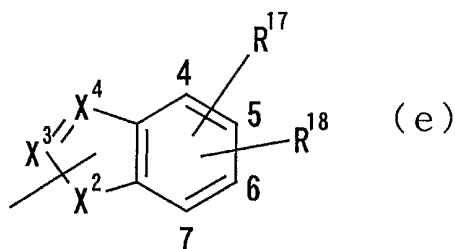


(in this group, X^1 , R^{14} , R^{15} and R^{16} have the same aforesaid meanings, and the numbers 4-7 denote positions), NH, NOH, N, O and S are preferred as X^1 , and NH, O and S are more preferred. R^{14} is preferably hydrogen atom, halogen atom, acyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkyl group, and, as for R^{15} and R^{16} , each independently hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group are preferred. As R^{15} and R^{16} , the case that one of them is hydrogen atom or halogen atom, preferably fluorine atom or chlorine atom and the other is hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group is preferred, wherein the case that the other is hydrogen atom, halogen atom, alkyl group or alkynyl group is particularly preferred. As halogen atom in this case, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkynyl group, ethynyl group is preferred. It should not be restricted in particular as the position in which halogen atom, alkyl group or alkynyl group is substituted, however, 4, 5 or 6-position in aforesaid formula is preferred. As embodiment group represented by aforesaid formula, 5-chloro indolyl group, 5-fluoro indolyl group, 5-bromo indolyl group, 5-ethinyl indolyl group, 5-methyl indolyl group, 5-chloro-4-fluoro indolyl group, 5-chloro-3-fluoro indolyl group, 5-fluoro-3-chloro indolyl group, 5-ethinyl-3-fluoro indolyl group, 5-chloro-3-(N,N-dimethylcarbamoyl) indolyl group, 5-fluoro-3-(N,N-dimethylcarbamoyl) indolyl group, 5-chloro-3-formyl indolyl group, 5-fluoro-3-formyl indolyl group, 6-chloro indolyl group, 6-fluoro indolyl group, 6-bromo indolyl group, 6-ethinyl indolyl group, 6-methyl indolyl group, 5-chlorobenzo thienyl group, 5-fluorobenzo thienyl group, 5-bromo benzothienyl group, 5-ethinyl benzothienyl group, 5-methylbenzo thienyl group, 5-chloro-4-fluorobenzo thienyl group, 6-chlorobenzo thienyl group, 6-fluorobenzo thienyl group, 6-bromo benzothienyl group, 6-ethinyl benzothienyl group, 6-methylbenzo thienyl group, 5-chlorobenzo furyl group, 5-fluorobenzo furyl group, 5-bromo benzofuryl group, 5-ethinyl benzofuryl group, 5-methylbenzo furyl group, 5-chloro-4-

fluorobenzo furyl group, 6-chlorobenzo furyl group, 6-fluorobenzo furyl group, 6-bromo benzofuryl group, 6-ethinyl benzofuryl group, 6-methylbenzo furyl group or the like can be nominated as preferred example, and the position that these substituents are combined with T¹ is not restricted in particular, however, 2 or 3 position in aforesaid formula (d) is preferred, in embodiment, 5-chloroindol-2-yl group, 5-fluoro indol-2-yl group, 5-bromo indol-2-yl group, 5-ethinyl indol-2-yl group, 5-methylindol-2-yl group, 5-chloro-4-fluoro indol-2-yl group, 5-chloro-3-fluoro indol-2-yl group, 3-bromo-5-chloroindol-2-yl group, 3-chloro-5-fluoro indol-2-yl group, 3-bromo-5-fluoro indol-2-yl group, 5-bromo-3-chloroindol-2-yl group, 5-bromo-3-fluoro indol-2-yl group, 5-chloro-3-formylindol-2-yl group, 5-fluoro-3-formylindol-2-yl group, 5-bromo-3-formylindol-2-yl group, 5-ethinyl-3-formylindol-2-yl group, 5-chloro-3-(N,N-dimethylcarbamoyl) indol-2-yl group, 5-fluoro-3-(N,N-dimethylcarbamoyl) indol-2-yl group, 5-bromo-3-(N,N-dimethylcarbamoyl) indol-2-yl group, 5-ethinyl-3-(N,N-dimethylcarbamoyl) indol-2-yl group, 6-chloroindol-2-yl group, 6-fluoro indol-2-yl group, 6-bromo indol-2-yl group, 6-ethinyl indol-2-yl group, 6-methylindol-2-yl group, 5-chloroindol-3-yl group, 5-fluoro indol-3-yl group, 5-bromo indol-3-yl group, 5-ethinyl indol-3-yl group, 5-methylindol-3-yl group, 5-chloro-4-fluoro indol-3-yl group, 6-chloroindol-3-yl group, 6-fluoro indol-3-yl group, 6-bromo indol-3-yl group, 6-ethinyl indol-3-yl group, 6-methylindol-3-yl group, 5-chlorobenzo thiophen-2-yl group, 5-fluorobenzo thiophen-2-yl group, 5-bromo benzo thiophen-2-yl group, 5-ethinyl benzo thiophen-2-yl group, 5-methylbenzo thiophen-2-yl group, 5-chloro-4-fluorobenzo thiophen-2-yl group, 6-chlorobenzo thiophen-2-yl group, 6-fluorobenzo thiophen-2-yl group, 6-bromo benzo thiophen-2-yl group, 6-ethinyl benzo thiophen-2-yl group, 6-methylbenzo thiophen-2-yl group, 5-chlorobenzo thiophen-3-yl group, 5-fluorobenzo thiophen-3-yl group, 5-bromo benzo thiophen-3-yl group, 5-ethinyl benzo thiophen-3-yl group, 5-methylbenzo thiophen-3-yl group, 5-chloro-4-fluorobenzo thiophen-3-yl group, 6-chlorobenzo thiophen-3-yl group, 6-fluorobenzo thiophen-3-yl group, 6-bromo benzo thiophen-3-yl group, 6-ethinyl benzo thiophen-3-yl group, 6-methylbenzo thiophen-3-yl group, 5-chlorobenzo furan-2-yl group, 5-fluorobenzo furan-2-yl group, 5-bromo benzofuran-2-yl group, 5-ethinyl benzofuran-2-yl group, 5-methylbenzofuran-2-yl group, 5-chloro-4-fluorobenzo furan-2-yl group, 6-chlorobenzo furan-2-yl group, 6-fluorobenzo furan-2-yl group, 6-bromo benzofuran-2-yl group, 6-ethinyl benzofuran-2-yl group, 6-methylbenzofuran-2-yl group, 5-chlorobenzo furan-3-yl group, 5-fluorobenzo furan-3-yl group, 5-bromo benzofuran-3-yl group, 5-ethinyl benzofuran-3-yl group, 5-methylbenzofuran-3-yl group, 5-chloro-4-fluorobenzo furan-3-yl group, 6-chlorobenzo furan-3-yl group, 6-fluorobenzo furan-3-yl group, 6-bromo benzofuran-3-yl group, 6-ethinyl benzofuran-3-yl group, 6-methylbenzofuran-3-yl group and the like are more preferably, and 5-chloroindol-2-yl group, 5-fluoro indol-2-yl group, 5-bromo indol-2-yl group, 5-ethinyl indol-2-yl group, 5-methylindol-2-yl group, 5-chloro-4-fluoro indol-2-yl group, 6-chloroindol-2-

yl group, 6-fluoro indol-2-yl group, 6-bromo indol-2-yl group, 6-ethinyl indol-2-yl group, 6-methylindol-2-yl group, 5-chloro-3-fluoro indol-2-yl group, 3-bromo-5-chloroindol-2-yl group, 3-chloro-5-fluoro indol-2-yl group, 3-bromo-5-fluoro indol-2-yl group, 5-bromo-3-chloroindol-2-yl group, 5-bromo-3-fluoro indol-2-yl group, 5-chloro-3-formylindol-2-yl group, 5-fluoro-3-formylindol-2-yl group, 5-bromo-3-formylindol-2-yl group, 5-ethinyl-3-formylindol-2-yl group, 5-chloro-3-(N,N-dimethylcarbamoyl) indol-2-yl group, 5-fluoro-3-(N,N-dimethylcarbamoyl) indol-2-yl group, 5-bromo-3-(N,N-dimethylcarbamoyl) indol-2-yl group, 5-ethinyl-3-(N,N-dimethylcarbamoyl) indol-2-yl group, 5-chlorobenzo thiophen-2-yl group, 5-fluorobenzo thiophen-2-yl group, 5-bromo benzo thiophen-2-yl group, 5-ethinyl benzo thiophen-2-yl group, 5-methylbenzo thiophen-2-yl group, 5-chloro-4-fluorobenzo thiophen-2-yl group, 6-chlorobenzo thiophen-2-yl group, 6-fluorobenzo thiophen-2-yl group, 6-bromo benzo thiophen-2-yl group, 6-ethinyl benzo thiophen-2-yl group, 6-methylbenzo thiophen-2-yl group, 5-chlorobenzo furan-2-yl group, 5-fluorobenzo furan-2-yl group, 5-bromo benzofuran-2-yl group, 5-ethinyl benzofuran-2-yl group, 5-methylbenzofuran-2-yl group, 5-chloro-4-fluorobenzo furan-2-yl group, 6-chlorobenzo furan-2-yl group, 6-fluorobenzo furan-2-yl group, 6-bromo benzofuran-2-yl group, 6-ethinyl benzofuran-2-yl group, 6-methylbenzofuran-2-yl group are particularly preferred.

In the following group

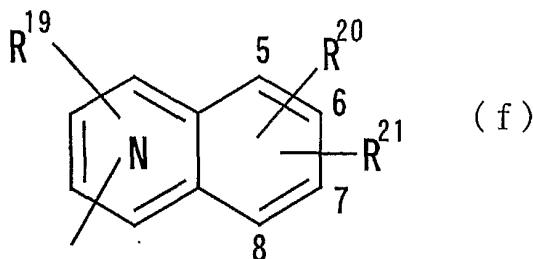


(in this group, X^2 , X^3 , X^4 , R^{17} and R^{18} have the same aforesaid meanings, and the numbers 4-7 denote positions), X^2 is preferably NH, O or S, and it is preferred that either of X^3 and X^4 is CH or C, and in particularly it is preferred that one is C. R^{17} and R^{18} each independently preferably-denote a hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group. As R^{17} and R^{18} , the case that one of them is hydrogen atom and the other is hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group is preferred, wherein the case that the other is hydrogen atom, halogen atom, alkyl group or alkynyl group is particularly preferred. As halogen atom in this case, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkynyl group, ethynyl group is preferred. It should not be

restricted in particular as the position in which halogen atom, alkyl group or alkynyl group is substituted, however, 5 or 6-position in aforesaid formula is preferred. As embodiment group represented by aforesaid formula, 5-chloro indazolyl group, 5-fluoro indazolyl group, 5-bromo indazolyl group, 5-ethinyl indazolyl group, 6-chloro indazolyl group, 6-fluoro indazolyl group, 6-bromo indazolyl group, 6-ethinyl indazolyl group, 5-chlorobenzo imidazolyl group, 5-fluorobenzo imidazolyl group, 5-bromo benzimidazolyl group, 5-ethinyl benzimidazolyl group, 6-chlorobenzo imidazolyl group, 6-fluorobenzo imidazolyl group, 6-bromo benzimidazolyl group, 6-ethinyl benzimidazolyl group, 5-chlorobenzo thiazolyl group, 5-fluorobenzo thiazolyl group, 5-bromo benzothiazolyl group, 5-ethinyl benzothiazolyl group, 6-chlorobenzo thiazolyl group, 6-fluorobenzo thiazolyl group, 6-bromo benzothiazolyl group, 6-ethinyl benzothiazolyl group, 5-chlorobenzo oxazolyl group, 5-fluorobenzo oxazolyl group, 5-bromo benzoxazolyl group, 5-ethinyl benzoxazolyl group, 6-chlorobenzo oxazolyl group, 6-fluorobenzo oxazolyl group, 6-bromo benzoxazolyl group, 6-ethinyl benzoxazolyl group, 5-chlorobenzo iso thiazolyl group, 5-fluorobenzo iso thiazolyl group, 5-bromo benzo iso thiazolyl group, 5-ethinyl benzo iso thiazolyl group, 6-chlorobenzo iso thiazolyl group, 6-fluorobenzo iso thiazolyl group, 6-bromo benzo iso thiazolyl group, 6-ethinyl benzo iso thiazolyl group, 5-chlorobenzo isoxazolyl group, 5-fluorobenzo isoxazolyl group, 5-bromo benzo isoxazolyl group, 5-ethinyl benzo isoxazolyl group, 6-chlorobenzo isoxazolyl group, 6-fluorobenzo isoxazolyl group, 6-bromo benzo isoxazolyl group, 6-ethinyl benzo isoxazolyl group or the like can be nominated as preferred example, and the position that these substituents are combined with T¹ is not restricted in particular, however, 5-chloro indazol-3-yl group, 5-fluoro indazol-3-yl group, 5-bromo indazol-3-yl group, 5-ethinyl indazol-3-yl group, 6-chloro indazol-3-yl group, 6-fluoro indazol-3-yl group, 6-bromo indazol-3-yl group, 6-ethinyl indazol-3-yl group, 5-chlorobenzo imidazol-2-yl group, 5-fluorobenzo imidazol-2-yl group, 5-bromo benzimidazol-2-yl group, 5-ethinyl benzimidazol-2-yl group, 6-chlorobenzo imidazol-2-yl group, 6-fluorobenzo imidazol-2-yl group, 6-bromo benzimidazol-2-yl group, 6-ethinyl benzimidazol-2-yl group, 5-chlorobenzo thiazol-2-yl group, 5-fluorobenzo thiazol-2-yl group, 5-bromo benzothiazol-2-yl group, 5-ethinyl benzothiazol-2-yl group, 6-chlorobenzo thiazol-2-yl group, 6-fluorobenzo thiazol-2-yl group, 6-bromo benzothiazol-2-yl group, 6-ethinyl benzothiazol-2-yl group, 5-chlorobenzo oxazol-2-yl group, 5-fluorobenzo oxazol-2-yl group, 5-bromo benzo oxazol-2-yl group, 5-ethinyl benzo oxazol-2-yl group, 6-chlorobenzo oxazol-2-yl group, 6-fluorobenzo oxazol-2-yl group, 6-bromo benzo oxazol-2-yl group, 6-ethinyl benzo oxazol-2-yl group, 5-chlorobenzo iso thiazol-3-yl group, 5-fluorobenzo iso thiazol-3-yl group, 5-bromo benzo iso thiazol-3-yl group, 5-ethinyl benzo iso thiazol-3-yl group, 6-chlorobenzo iso thiazol-3-yl group, 6-fluorobenzo iso thiazol-3-yl group, 6-bromo benzo iso thiazol-3-yl group, 6-ethinyl benzo iso thiazol-3-yl group, 5-chlorobenzo isoxazol-3-yl group, 5-fluorobenzo isoxazol-3-yl group, 5-bromo benzo

isoxazol-3-yl group, 5-ethinyl benzo isoxazol-3-yl group, 6-chlorobenzo isoxazol-3-yl group, 6-fluorobenzo isoxazol-3-yl group, 6-bromo benzo isoxazol-3-yl group, 6-ethinyl benzo isoxazol-3-yl group are more preferred, and among these, 5-chlorobenzo imidazol-2-yl group, 5-fluorobenzo imidazol-2-yl group, 5-bromo benzimidazol-2-yl group, 5-ethinyl benzimidazol-2-yl group, 6-chlorobenzo imidazol-2-yl group, 6-fluorobenzo imidazol-2-yl group, 6-bromo benzimidazol-2-yl group, 6-ethinyl benzimidazol-2-yl group, 5-chlorobenzo thiazol-2-yl group, 5-fluorobenzo thiazol-2-yl group, 5-bromo benzothiazol-2-yl group, 5-ethinyl benzothiazol-2-yl group, 6-chlorobenzo thiazol-2-yl group, 6-fluorobenzo thiazol-2-yl group, 6-bromo benzothiazol-2-yl group, 6-ethinyl benzothiazol-2-yl group, 5-chlorobenzo oxazol-2-yl group, 5-fluorobenzo oxazol-2-yl group, 5-bromo benzo oxazol-2-yl group, 5-ethinyl benzo oxazol-2-yl group, 6-chlorobenzo oxazol-2-yl group, 6-fluorobenzo oxazol-2-yl group, 6-bromo benzo oxazol-2-yl group, 6-ethinyl benzo oxazol-2-yl group are in particular preferred, and furthermore, 5-chlorobenzo imidazol-2-yl group, 5-fluorobenzo imidazol-2-yl group, 5-bromo benzimidazol-2-yl group, 5-ethinyl benzimidazol-2-yl group are even more preferred.

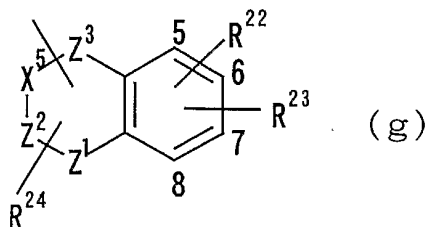
In following group



(in this group, N denotes that 1 or 2 of carbon atom on ring in which R^{19} is substituted is substituted by nitrogen atom, and R^{19} , R^{20} and R^{21} have the same aforesaid meanings, and the numbers 5-8 denote positions), R^{19} , R^{20} and R^{21} preferably independently denote hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group, as R^{19} , hydrogen atom is in particular preferred and as R^{20} and R^{21} , the case that one of them is hydrogen atoms and the other is hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group is preferred, wherein the case that the other is hydrogen atom, halogen atom, alkyl group or alkynyl group is particularly preferred. As halogen atom in this case, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkynyl group, ethynyl group is preferred. the position in which halogen atom, alkyl group or alkynyl group is substituted should not be restricted in particular, however, 6 or 7 position in aforesaid formula is preferred. As embodiment group represented by aforesaid formula, quinolinyl group, in quinolinyl group, cinnolinyl group are proposed

and 6-chloro quinolinyl group, 6-fluoro quinolinyl group, 6-bromo quinolinyl group, 6-ethinyl quinolinyl group, 6-chloro iso quinolinyl group, 6-fluoro iso quinolinyl group, 6-bromo iso quinolinyl group, 6-ethinyl iso quinolinyl group, 7-chloro cinnolinyl group, 7-fluoro cinnolinyl group, 7-bromo cinnolinyl group, 7-ethinyl cinnolinyl group and the like are preferred. In particular, 6-chloroquinolin-2-yl group, 6-fluoro quinolin-2-yl group, 6-bromo quinolin-2-yl group, 6-ethinyl quinolin-2-yl group, 6-chloroquinolin-3-yl group, 6-fluoro quinolin-3-yl group, 6-bromo quinolin-3-yl group, 6-ethinyl quinolin-3-yl group, 7-chloroquinolin-2-yl group, 7-fluoro quinolin-2-yl group, 7-bromo quinolin-2-yl group, 7-ethinyl quinolin-2-yl group, 7-chloroquinolin-3-yl group, 7-fluoro quinolin-3-yl group, 7-bromo quinolin-3-yl group, 7-ethinyl quinolin-3-yl group, 6-chloroisoquinolin-3-yl group, 6-fluoro isoquinolin-3-yl group, 6-bromo isoquinolin-3-yl group, 6-ethinyl isoquinolin-3-yl group, 7-chloroisoquinolin-3-yl group, 7-fluoro isoquinolin-3-yl group, 7-bromo isoquinolin-3-yl group, 7-ethinyl isoquinolin-3-yl group, 7-chloro cinnolin-3-yl group, 7-fluoro cinnolin-3-yl group, 7-bromo cinnolin-3-yl group, 7-ethinyl cinnolin-3-yl group and the like are preferred, and furthermore, 6-chloroquinolin-2-yl group, 6-fluoro quinolin-2-yl group, 6-bromo quinolin-2-yl group, 6-ethinyl quinolin-2-yl group, 7-chloroquinolin-3-yl group, 7-fluoro quinolin-3-yl group, 7-bromo quinolin-3-yl group, 7-ethinyl quinolin-3-yl group, 7-chloroisoquinolin-3-yl group, 7-fluoro isoquinolin-3-yl group, 7-bromo isoquinolin-3-yl group, 7-ethinyl isoquinolin-3-yl group, 7-chloro cinnolin-3-yl group, 7-fluoro cinnolin-3-yl group, 7-bromo cinnolin-3-yl group, 7-ethinyl cinnolin-3-yl group are even more preferred.

In following group



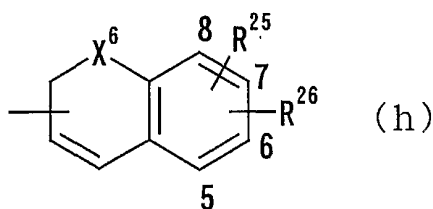
(in this group, the numbers 5-8 denote positions, X^5 denotes CH_2 , CH , N or NH , Z^1 denotes N , NH or O , Z^2 denotes CH_2 , CH , C or N , Z^3 denotes CH_2 , CH , S , SO_2 or $C=O$, X^5-Z^2 denotes that X^5 and Z^2 are bonded with single bond or double bond, R^{22} , R^{23} and R^{24} have the same aforesaid meanings, and the numbers 5-8 denote positions), R^{22} and R^{23} preferably each independently denote a hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group. As R^{22} and R^{23} , the case that one of them is hydrogen atom and the other is hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group is preferred, wherein

the case that the other is hydrogen atom, halogen atom, alkyl group or alkynyl group is particularly preferred. As halogen atom in this case, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkynyl group, ethynyl group is preferred. It should not be restricted in particular as the position in which halogen atom, alkyl group or alkynyl group is substituted, however, 6 or 7 position in aforesaid formula is preferred. As R²⁴, hydrogen atom or alkyl group is preferred, as alkyl group, methyl group is preferred. As R²⁴, hydrogen atom is particularly preferred. As embodiment group represented by aforesaid formula, 4-oxo dihydroquinolinyl group, tetrahydroquinolinyl group, dihydroquinazolin-4-on-2-yl group, 4-oxo tetrahydrocinnolinyl group, 4-oxo benzopyranyl group, 4-oxo benzo thiadiazinyl group, 1,1-dihydroxy-4-oxo benzo thiadiazinyl group, benz oxadiazinyl group can be nominated. As more embodiment group, 6-chloro-4-oxo-dihydroquinolinyl group, 6-fluoro-4-oxo quinolinyl group, 6-bromo-4-oxo-dihydroquinolinyl group, 6-ethynyl-4-oxo-dihydroquinolinyl group, 7-chloro-4-oxo-dihydroquinolinyl group, 7-fluoro-4-oxo-dihydroquinolinyl group, 7-bromo-4-oxo-dihydroquinolinyl group, 7-ethynyl-4-oxo-dihydroquinolinyl group, 6-chloro-4-oxo-1,4-dihydroquinazolinyl group, 6-fluoro-4-oxo-1,4-dihydroquinazolinyl group, 6-bromo-4-oxo-1,4-dihydroquinoxalyl group, 6-ethynyl-4-oxo-1,4-dihydroquinazolinyl group, 7-chloro-4-oxo-1,4-dihydroquinazolinyl group, 7-fluoro-4-oxo-1,4-dihydroquinazolinyl group, 7-ethynyl-4-oxo-1,4-dihydroquinazolinyl group, 6-chloro-1,2,3,4-tetrahydroquinolinyl group, 6-fluoro-1,2,3,4-tetrahydroquinolinyl group, 6-bromo-1,2,3,4-tetrahydroquinolinyl group, 6-ethynyl-1,2,3,4-tetrahydroquinolinyl group, 7-chloro-1,2,3,4-tetrahydroquinolinyl group, 7-fluoro-1,2,3,4-tetrahydroquinolinyl group, 7-bromo-1,2,3,4-tetrahydroquinolinyl group, 7-ethynyl-1,2,3,4-tetrahydroquinolinyl group, 6-chloro-1,2,3,4-tetrahydro-4-oxo cinnolinyl group, 6-fluoro-1,2,3,4-tetrahydro-4-oxo cinnolinyl group, 6-bromo-1,2,3,4-tetrahydro-4-oxo cinnolinyl group, 6-ethynyl-1,2,3,4-tetrahydro-4-oxo cinnolinyl group, 7-chloro-1,2,3,4-tetrahydro-4-oxo cinnolinyl group, 7-fluoro-1,2,3,4-tetrahydro-4-oxo cinnolinyl group, 7-bromo-1,2,3,4-tetrahydro-4-oxo cinnolinyl group, 7-ethynyl-1,2,3,4-tetrahydro-4-oxo cinnolinyl group, 6-chloro-4H-4-oxo benzopyranyl group, 6-fluoro-4H-4-oxo benzopyranyl group, 6-bromo-4H-4-oxo benzopyranyl group, 6-ethynyl-4H-4-oxo benzopyranyl group, 7-chloro-4H-4-oxo benzopyranyl group, 7-fluoro-4H-4-oxo benzopyranyl group, 7-bromo-4H-4-oxo benzopyranyl group, 7-ethynyl-4H-4-oxo benzopyranyl group, 6-chloro-1,1-dihydroxy-2H-1,2,4-benzo thiadiazinyl group, 6-fluoro-1,1-dihydroxy-2H-1,2,4-benzo thiadiazinyl group, 6-bromo-1,1-dihydroxy-2H-1,2,4-benzo thiadiazinyl group, 6-ethynyl-1,1-dihydroxy-2H-1,2,4-benzo thiadiazinyl group, 7-chloro-1,1-dihydroxy-2H-1,2,4-benzo thiadiazinyl group, 7-fluoro-1,1-

dihydroxy-2H-1,2,4-benzo thiadiazinyl group, 7-bromo-1,1-dihydroxy-2H-1,2,4-benzo thiadiazinyl group, 7-ethinyl-1,1-dihydroxy-2H-1,2,4-benzo thiadiazinyl group, 6-chloro-2H-1,2,4-benz oxadiazinyl group, 6-fluoro-2H-1,2,4-benz oxadiazinyl group, 6-bromo-2H-1,2,4-benz oxadiazinyl group, 6-ethinyl-2H-1,2,4-benz oxadiazinyl group, 7-chloro-2H-1,2,4-benz oxadiazinyl group, 7-fluoro-2H-1,2,4-benz oxadiazinyl group, 7-bromo-2H-1,2,4-benz oxadiazinyl group, 7-ethinyl-2H-1,2,4-benz oxadiazinyl group and the like are proposed, in particular 6-chloro-1,4-dihydroquinolin-4-on-2-yl group, 6-fluoro-1,4-dihydroquinolin-4-on-2-yl group, 6-bromo-1,4-dihydroquinolin-4-on-2-yl group, 6-ethinyl-1,4-dihydroquinolin-4-on-2-yl group, 7-chloro-1,4-dihydroquinolin-4-on-2-yl group, 7-fluoro-1,4-dihydroquinolin-4-on-2-yl group, 7-bromo-1,4-dihydroquinolin-4-on-2-yl group, 7-ethinyl-1,4-dihydroquinolin-4-on-2-yl group, 6-chloro-1,4-dihydroquinazolin-4-on-2-yl group, 6-fluoro-1,4-dihydroquinazolin-4-on-2-yl group, 6-bromo-1,4-dihydroquinazolin-4-on-2-yl group, 6-ethinyl-1,4-dihydroquinazolin-4-on-2-yl group, 7-chloro-1,4-dihydroquinazolin-4-on-2-yl group, 7-fluoro-1,4-dihydroquinazolin-4-on-2-yl group, 7-bromo-1,4-dihydroquinazolin-4-on-2-yl group, 7-ethinyl-1,4-dihydroquinazolin-4-on-2-yl group, 6-chloro-1,2,3,4-tetrahydroquinoline-2-yl group, 6-fluoro-1,2,3,4-tetrahydroquinoline-2-yl group, 6-bromo-1,2,3,4-tetrahydroquinoline-2-yl group, 6-ethinyl-1,2,3,4-tetrahydroquinoline-2-yl group, 6-chloro-1,2,3,4-tetrahydro-4-oxo cinnoline-2-yl group, 6-fluoro-1,2,3,4-tetrahydro-4-oxo cinnoline-2-yl group, 6-bromo-1,2,3,4-tetrahydro-4-oxo cinnoline-2-yl group, 6-ethinyl-1,2,3,4-tetrahydro-4-oxo cinnoline-2-yl group, 7-chloro-1,2,3,4-tetrahydro-4-oxo cinnoline-2-yl group, 7-fluoro-1,2,3,4-tetrahydro-4-oxo cinnoline-2-yl group, 7-bromo-1,2,3,4-tetrahydro-4-oxo cinnoline-2-yl group, 7-ethinyl-1,2,3,4-tetrahydro-4-oxo cinnoline-2-yl group, 6-chloro-4H-4-oxo benzopyran-2-yl group, 6-fluoro-4H-4-oxo benzopyran-2-yl group, 6-bromo-4H-4-oxo benzopyran-2-yl group, 6-ethinyl-4H-4-oxo benzopyran-2-yl group, 7-chloro-4H-4-oxo benzopyran-2-yl group, 7-fluoro-4H-4-oxo benzopyran-2-yl group, 7-bromo-4H-4-oxo benzopyran-2-yl group, 7-ethinyl-4H-4-oxo benzopyran-2-yl group, 6-chloro-1,1-dihydroxy-2H-1,2,4-benzothiadiazin-3-yl group, 6-fluoro-1,1-dihydroxy-2H-1,2,4-benzothiadiazin-3-yl group, 6-bromo-1,1-dihydroxy-2H-1,2,4-benzothiadiazin-3-yl group, 6-ethinyl-1,1-dihydroxy-2H-1,2,4-benzothiadiazin-3-yl group, 7-chloro-1,1-dihydroxy-2H-1,2,4-benzothiadiazin-3-yl group, 7-fluoro-1,1-dihydroxy-2H-1,2,4-benzothiadiazin-3-yl group, 7-bromo-1,1-dihydroxy-2H-1,2,4-benzothiadiazin-3-yl group, 7-ethinyl-1,1-dihydroxy-2H-1,2,4-benzothiadiazin-3-yl group, 6-chloro-2H-1,2,4-benz oxadiazin-3-yl group, 6-fluoro-2H-1,2,4-benz oxadiazin-3-yl group, 6-bromo-2H-1,2,4-benz oxadiazin-3-yl group, 6-ethinyl-2H-1,2,4-benz oxadiazin-3-yl group, 7-chloro-2H-1,2,4-benz oxadiazin-3-yl group, 7-fluoro-2H-1,2,4-benz oxadiazin-3-yl group, 7-bromo-2H-1,2,4-

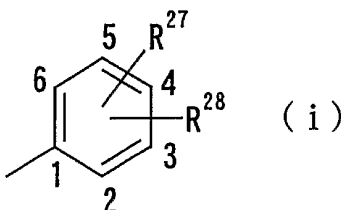
benz oxadiazin-3-yl group, 7-ethinyl-2H-1,2,4-benz oxadiazin-3-yl group are preferred, and furthermore 6-chloro-1,4-dihydroquinolin-4-on-2-yl group, 6-fluoro-1,4-dihydroquinolin-4-on-2-yl group, 6-bromo-1,4-dihydroquinolin-4-on-2-yl group, 6-ethinyl-1,4-dihydroquinolin-4-on-2-yl group, 6-chloro-1,4-dihydroquinazolin-4-on-2-yl group, 6-fluoro-1,4-dihydroquinazolin-4-on-2-yl group, 6-bromo-1,4-dihydroquinazolin-4-on-2-yl group, 6-ethinyl-1,4-dihydroquinazolin-4-on-2-yl group are even more preferred.

In following group



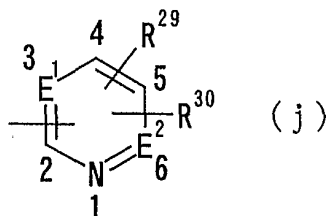
(in this group, X^6 denotes O or S, and R^{25} and R^{26} have the same aforesaid meanings, and the numbers of 5-8 denote positions), O is preferred as X^6 , R^{25} and R^{26} each independently preferably-denote a hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group. It is preferred the case that one of R^{25} and R^{26} is hydrogen atom and the other is hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group, and in particularly the case that the other is hydrogen atom, halogen atom, alkyl group or alkynyl group is preferred. As halogen atom in this case, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkynyl group, ethynyl group is preferred. It should not be restricted in particular as the position in which halogen atom, alkyl group or alkynyl group is substituted, however, 6 or 7 position in aforesaid formula is preferred. As embodiment group, 6-chloro-2H-chromen-3-yl group, 6-fluoro-2H-chromen-3-yl group, 6-bromo-2H-chromen-3-yl group, 6-ethinyl-2H-chromen-3-yl group, 7-chloro-2H-chromen-3-yl group, 7-fluoro-2H-chromen-3-yl group, 7-bromo-2H-chromen-3-yl group, 7-ethinyl-2H-chromen-3-yl group are nominated. In particularly 7-chloro-2H-chromen-3-yl group, 7-fluoro-2H-chromen-3-yl group, 7-bromo-2H-chromen-3-yl group, 7-ethinyl-2H-chromen-3-yl group are preferred.

In following group



(in this group, R^{27} and R^{28} have the same aforesaid meanings, and the numbers of 1-6 denote positions), as R^{27} and R^{28} , is the preferred the case that one of them is hydrogen atom or halogen atom and the other is hydrogen atom, cyano group, nitro group, amino group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group or N,N-dialkyl carbamoyl group, and in particularly, the case that the other is hydrogen atom, halogen atom, alkyl group or alkynyl group is preferred. In this case, as halogen atom, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkynyl group, ethynyl group is particularly preferred. As embodiment group represented by aforesaid formula, chlorophenyl group, fluorophenyl group, bromo phenyl group, ethinyl phenyl group, chloro fluorophenyl group can be proposed as preferred example, and as the position in which halogen atom, alkyl group or alkynyl group in those groups is substituted should not be restricted in particular, and in case of 1 substituent, 3 and 4 position in aforesaid formula is in particular preferred and in case of 2 substituents, combination of 4 and 2 or 3 position in aforesaid formula is particularly preferred. As embodiments it can be proposed as preferred example of 4-chlorophenyl group, 4-fluorophenyl group, 4-bromo phenyl group, 4-ethinyl phenyl group, 3-chlorophenyl group, 3-fluorophenyl group, 3-bromo phenyl group, 3-ethinyl phenyl group, 3-chloro-4-fluorophenyl group, 4-chloro-3-fluorophenyl group, 4-chloro-2-fluorophenyl group, 2-chloro-4-fluorophenyl group, 4-bromo-2-fluorophenyl group, 2-bromo-4-fluorophenyl group, 2,4-dichlorophenyl group, 2,4-difluorophenyl group, 2,4-dibromo phenyl group, 4-chloro-3-methylphenyl group, 4-fluoro-3-methylphenyl group, 4-bromo-3-methylphenyl group, 4-chloro-2-methylphenyl group, 4-fluoro-2-methylphenyl group, 4-bromo-2-methylphenyl group, 3,4-dichlorophenyl group, 3,4-difluorophenyl group, 3,4-dibromo phenyl group.

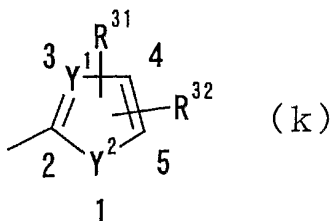
In



(in this group, E^1 , B^2 , R^{29} and R^{30} have the same aforesaid meanings, and the numbers of 1-6 denote positions), as R^{29} and R^{30} , it is preferred the case that one of them is hydrogen atom or halogen atom and the other is hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group, and in particularly, the case that the other is hydrogen atom, halogen atom, alkyl group or alkynyl group is preferred. In this case, as halogen atom, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkynyl group, ethynyl group is particularly preferred. As embodiment group represented by aforesaid formula, pyridyl group, pyrimidyl group, pyridazinyl group or the like is nominated, it should not be restricted in particular as the position in which halogen atom, alkyl group or alkynyl group is substitute in those groups, however, 4 and 5 position in aforesaid formula are particularly preferred when there is a bond of group T^1 at 2 position in aforesaid formula. In embodiment it can be proposed 2-pyridyl group, 3-pyridyl group, 4-pyridyl group, 4-chloro-2-pyridyl group, 4-fluoro-2-pyridyl group, 4-bromo-2-pyridyl group, 4-ethinyl-2-pyridyl group, 4-chloro-3-pyridyl group, 4-fluoro-3-pyridyl group, 4-bromo-3-pyridyl group, 4-ethinyl-3-pyridyl group, 5-chloro-2-pyridyl group, 5-fluoro-2-pyridyl group, 5-bromo-2-pyridyl group, 5-ethinyl-2-pyridyl group, 4-chloro-5-fluoro-2-pyridyl group, 5-chloro-4-fluoro-2-pyridyl group, 5-chloro-3-pyridyl group, 5-fluoro-3-pyridyl group, 5-bromo-3-pyridyl group, 5-ethinyl-3-pyridyl group, 5-chloro-2-pyrimidyl group, 5-fluoro-2-pyrimidyl group, 5-bromo-2-pyrimidyl group, 5-ethinyl-2-pyrimidyl group, 4-chloro-3-pyridazinyl group, 4-fluoro-3-pyridazinyl group, 4-bromo-3-pyridazinyl group, 4-ethinyl-3-pyridazinyl group, 6-chloro-3-pyridazinyl group, 6-fluoro-3-pyridazinyl group, 6-bromo-3-pyridazinyl group, 6-ethinyl-3-pyridazinyl group and the like as preferred example, in particular 2-pyridyl group, 3-pyridyl group, 4-pyridyl group, 4-chloro-2-pyridyl group, 4-fluoro-2-pyridyl group, 4-bromo-2-pyridyl group, 4-ethinyl-2-pyridyl group, 4-chloro-3-pyridyl group, 4-fluoro-3-pyridyl group, 4-bromo-3-pyridyl group, 4-ethinyl-3-pyridyl group, 5-chloro-2-pyridyl group, 5-fluoro-2-pyridyl group, 5-bromo-2-pyridyl group, 5-ethinyl-2-pyridyl group, 4-chloro-5-fluoro-2-pyridyl group, 5-chloro-4-fluoro-2-pyridyl group, 5-chloro-3-pyridyl group, 5-fluoro-3-pyridyl group, 5-bromo-3-pyridyl group, 5-ethinyl-3-pyridyl group, 6-chloro-3-pyridazinyl group, 6-fluoro-3-pyridazinyl group, 6-bromo-

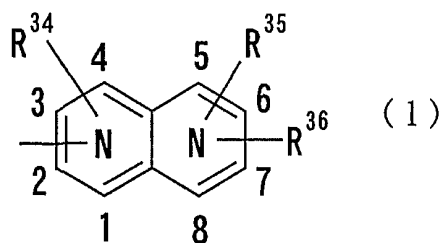
3-pyridazinyl group, 6-ethinyl-3-pyridazinyl group are preferred, and among them, 2-pyridyl group, 3-pyridyl group, 4-pyridyl group, 5-chloro-2-pyridyl group, 5-fluoro-2-pyridyl group, 5-bromo-2-pyridyl group, 5-ethinyl-2-pyridyl group, 5-chloro-4-fluoro-2-pyridyl group, 4-chloro-5-fluoro-2-pyridyl group, 4-chloro-3-pyridazinyl group, 4-fluoro-3-pyridazinyl group, 4-bromo-3-pyridazinyl group, 4-ethinyl-3-pyridazinyl group are more preferred.

Moreover, in following group



(in this group, Y^1 , Y^2 , R^{31} and R^{32} have the same aforesaid meanings, and the numbers of 1-5 denote positions), as R^{31} and R^{32} , it is preferred the case that one of them is hydrogen atom or halogen atom and the other is hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group. Wherein the case that the other is hydrogen atom, halogen atom, alkyl group or alkynyl group is particularly preferred. In this case, as halogen atom, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkynyl group, ethynyl group is particularly preferred. As embodiment group represented by aforesaid formula, thienyl group, pyrrolyl group, furyl group, oxazolyl group, thiazolyl group and the like are proposed. It should not be restricted in particular as the position in which halogen atom, alkyl group or alkynyl group is substituted in those groups, however, 4 and 5 position in aforesaid formula are particularly preferred. As embodiments 4-chloro-2-thienyl group, 4-fluoro-2-thienyl group, 4-bromo-2-thienyl group, 4-ethinyl-2-thienyl group, 4-chloro-2-pyrrolyl group, 4-fluoro-2-pyrrolyl group, 4-bromo-2-pyrrolyl group, 4-ethinyl-2-pyrrolyl group, 4-chloro-2-furyl group, 4-fluoro-2-furyl group, 4-bromo-2-furyl group, 4-ethinyl-2-furyl group, 5-chloro-2-thienyl group, 5-fluoro-2-thienyl group, 5-bromo-2-thienyl group, 5-ethinyl-2-thienyl group, 5-chloro-2-thiazolyl group, 5-fluoro-2-thiazolyl group, 5-bromo-2-thiazolyl group, 5-ethinyl-2-thiazolyl group, 5-chloro-2-oxazolyl group, 5-fluoro-2-oxazolyl group, 5-bromo-2-oxazolyl group, 5-ethinyl-2-oxazolyl group are nominated. In particular, 5-chloro-2-thiazolyl group, 5-fluoro-2-thiazolyl group, 5-bromo-2-thiazolyl group, 5-ethinyl-2-thiazolyl group are preferred.

And moreover in following group



(in this group, the numbers of 1-8 denote positions, each N denotes that any one of carbon atom at 1-4 and any one of carbon atom at 5-8 is respectively substituted by one nitrogen atom and R³⁴-R³⁶ have the same aforesaid definition), the position of each nitrogen atom may be in any positioning, and R³⁴ is preferably hydrogen atom or halogen atom, the case that one of R³⁵ and R³⁶ is hydrogen atom or halogen atom and the other is hydrogen atom, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group or halogeno alkyl group is preferred. Wherein the case that the other is hydrogen atom, halogen atom, alkyl group or alkynyl group is particularly preferred. As halogen atom, fluorine atom, chlorine atom and bromine atom are preferred, as alkyl group, methyl group is preferred, as alkynyl group, ethynyl group is particularly preferred. As the position which halogen atom, alkyl group or alkynyl group is substituted, it should not be restricted in particular, however, as embodiment group represented by aforesaid formula, 6-chloro-1,5-naphthyridin-2-yl group, 6-fluoro-1,5-naphthyridin-2-yl group, 6-bromo-1,5-naphthyridin-2-yl group, 6-ethinyl-1,5-naphthyridin-2-yl group, 7-chloro-1,5-naphthyridin-2-yl group, 7-fluoro-1,5-naphthyridin-2-yl group, 7-bromo-1,5-naphthyridin-2-yl group, 7-ethinyl-1,5-naphthyridin-2-yl group, 6-chloro-1,5-naphthyridin-3-yl group, 6-fluoro-1,5-naphthyridin-3-yl group, 6-bromo-1,5-naphthyridin-3-yl group, 6-ethinyl-1,5-naphthyridin-3-yl group, 7-chloro-1,5-naphthyridin-3-yl group, 7-fluoro-1,5-naphthyridin-3-yl group, 7-bromo-1,5-naphthyridin-3-yl group, 7-ethinyl-1,5-naphthyridin-3-yl group, 6-chloro-1,7-naphthyridin-2-yl group, 6-fluoro-1,7-naphthyridin-2-yl group, 6-bromo-1,7-naphthyridin-2-yl group, 6-ethinyl-1,7-naphthyridin-2-yl group, 6-chloro-1,7-naphthyridin-3-yl group, 6-fluoro-1,7-naphthyridin-3-yl group, 6-bromo-1,7-naphthyridin-3-yl group, 6-ethinyl-1,7-naphthyridin-3-yl group, 6-chloro-1,8-naphthyridin-2-yl group, 6-fluoro-1,8-naphthyridin-2-yl group, 6-bromo-1,8-naphthyridin-2-yl group, 6-ethinyl-1,8-naphthyridin-2-yl group, 7-chloro-1,8-naphthyridin-2-yl group, 7-fluoro-1,8-naphthyridin-2-yl group, 7-bromo-1,8-naphthyridin-2-yl group, 7-ethinyl-1,8-naphthyridin-2-yl group, 6-chloro-1,8-naphthyridin-3-yl group, 6-fluoro-1,8-naphthyridin-3-yl group, 6-bromo-1,8-naphthyridin-3-yl group, 6-ethinyl-1,8-naphthyridin-3-yl group, 7-chloro-1,8-naphthyridin-3-yl group,

7-fluoro-1,8-naphthyridin-3-yl group, 7-bromo-1,8-naphthyridin-3-yl group, 7-ethinyl-1,8-naphthyridin-3-yl group, 6-chloro-2,5-naphthyridin-3-yl group, 6-fluoro-2,5-naphthyridin-3-yl group, 6-bromo-2,5-naphthyridin-3-yl group, 6-ethinyl-2,5-naphthyridin-3-yl group, 7-chloro-2,5-naphthyridin-3-yl group, 7-fluoro-2,5-naphthyridine-3-yl group, 7-bromo-2,5-naphthyridin-3-yl group, 7-ethinyl-2,5-naphthyridin-3-yl group, 7-chloro-2,6-naphthyridin-3-yl group, 7-fluoro-2,6-naphthyridin-3-yl group, 7-bromo-2,6-naphthyridin-3-yl group, 7-ethinyl mountain 2,6-naphthyridin-3-yl group, 6-chloro-2,8-naphthyridin-3-yl group, 6-fluoro-2,8-naphthyridin-3-yl group, 6-bromo-2,8-naphthyridin-3-yl group, 6-ethinyl-2,8-naphthyridin-3-yl group, 7-chloro-2,8-naphthyridin-3-yl group, 7-fluoro-2,8-naphthyridin-3-yl group, 7-bromo-2,8-naphthyridin-3-yl group, 7-ethinyl-2,8-naphthyridin-3-yl group and the like are proposed, and in particular, 7-chloro-2,5-naphthyridin-3-yl group, 7-fluoro-2,5-naphthyridin-3-yl group, 7-bromo-2,5-naphthyridin-3-yl group, 7-ethinyl-2,5-naphthyridin-3-yl group and the like are preferably nominated.

In addition of aforesaid 12 kinds (a)-(1), optionally substituted thieno pyrrolyl group is preferred, too. It may contain substituent of 1-3, and as substituent, hydroxy group, nitro group, amino group, cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group, halogeno alkyl group, hydroxyalkyl group, alkoxy group, alkoxyalkyl group, carboxyl group, carboxyalkyl group, acyl group, carbamoyl group, N-alkylcarbamoyl group, N,N-dialkyl carbamoyl group, alkoxy carbonyl group, amidino group and alkoxy carbonyl alkyl group can be nominated, and wherein cyano group, halogen atom, alkyl group, alkenyl group, alkynyl group and halogeno alkyl group are preferred. As embodiments 2-chloro-thieno [2,3-b] pyrrol-5-yl group, 2-fluoro-thieno [2,3-b] pyrrol-5-yl group, 2-bromo-thieno [2,3-b] pyrrol-5-yl group or 2-ethinyl-thieno [2,3-b] pyrrol-5-yl group can be preferably nominated.

About group Q¹.

In accordance with this invention, Q¹ denotes saturated or unsaturated 5-6 membered cyclic hydrocarbon group which may have substituent, saturated or unsaturated 5-7 membered heterocyclic group which may have substituent, saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group which may have substituent or saturated or unsaturated bicyclic or tricyclic condensed heterocyclic group.

As aforesaid saturated or unsaturated 5-6 membered cyclic hydrocarbon group, for example cyclopentyl group, cyclopentenyl group, cyclohexyl group, cyclohexenyl group, phenyl group can be nominated, and cyclopentyl group, cyclohexyl group and phenyl group are preferred, and phenyl group is more preferred.

Saturated or unsaturated 5-7 membered heterocyclic group denotes the one in which the heterocycle containing at least 1 heteroatom selected from oxygen atom, sulfur atom and nitrogen atom becomes monovalent group, for example furyl group, pyrrolyl group, thienyl group, pyrazolyl group, imidazolyl group, pyrazolinyl group, oxazolyl group, oxazolinylyl group, thiazolyl group, thiazolinyl group, thiadiazolyl group, furazanyl group, pyranyl group, pyridyl group, pyrimidyl group, pyridazinyl group, pyrrolidinyl group, piperazinyl group, piperidinyl group, oxazinyl group, oxadiazinyl group, morpholinyl group, thiazinyl group, thiadiazinyl group, thiomorpholinyl group, tetrazolyl group, triazolyl group, triazinyl group, azepinyl group, diazepinyl group or tri azepinyl group can be nominated, thienyl group, pyrazolyl group, imidazolyl group, oxazolyl group, thiazolyl group, thiadiazolyl group, furazanyl group, pyridyl group, pyrimidyl group, pyridazinyl group, pyrrolidinyl group, piperazinyl group, piperidinyl group, morpholinyl group, thiadiazinyl group and triazolyl group are preferred, and thienyl group, thiazolyl group, pyrazolyl group, imidazolyl group, pyridyl group, pyrimidyl group, pyridazinyl group, pyrrolidinyl group, piperazinyl group and piperidinyl group are more preferred. Moreover, among these heterocyclic groups, it may form N-oxide in nitrogen containing heterocyclic group .

As saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group, it is denoted same as saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group described in explanation of Q⁴ in general formula (1), and as embodiment example, indenyl group, indanyl group, naphthyl group, tetrahydronaphthyl group, anthryl group, phenanthryl group can be nominated, and indenyl group, indanyl group, naphthyl group and tetrahydronaphthyl group are preferred.

As saturated or unsaturated bicyclic or tricyclic condensed polycyclic group, it is denoted same as saturated or unsaturated bicyclic or tricyclic condensed polycyclic group described in explanation of Q⁴ in general formula (1), and as embodiment example, benzofuryl group, isobenzofuryl group, benzothieryl group, indolyl group, indolinyl group, isoindolyl group, isoindolinyl group, indazolyl group, quinolyl group, dihydroquinolyl group, 4-oxo-dihydroquinolyl group (dihydroquinolin-4-one), tetrahydroquinolyl

group, isoquinolyl group, tetrahydroisoquinolyl group, chromenyl group, chromanyl group, iso chromanyl group, 4H-4-oxo benzopyranyl group, 3,4-dihydro-4H-4-oxo benzopyranyl group, 4H-quinolidinyl group, quinazolinyl group, dihydroquinazolinyl group, tetrahydroquinazolinyl group, quinoxalinyl group, tetrahydroquinoxalinyl group, cinnolinyl group, tetrahydrocinnolinyl group, indolizinyl group, tetrahydroindolizinyl group, benzothiazolyl group, tetrahydrobenzo thiazolyl group, benzoxazolyl group, benzo isothiazolyl group, benzo isoxazolyl group, benzimidazolyl group, naphthyridinyl group, tetrahydronaphthyridinyl group, thieno pyridyl group, tetrahydrothieno pyridyl group, thiazolo pyridyl group, tetrahydrothiazolo pyridyl group, thiazolo pyridazinyl group, tetrahydrothiazolo pyridazinyl group, pyrrolo pyridyl group, dihydropyrrolo pyridyl group, tetrahydropyrrolo pyridyl group, pyrrolo pyrimidinyl group, dihydropyrrolo pyrimidinyl group, pyrido quinazolinyl group, dihydropyrido quinazolinyl group, pyrido pyrimidinyl group, tetrahydropyrido pyrimidinyl group, pyrano thiazolyl group, dihydropyrano thiazolyl group, furo pyridyl group, tetrahydrofuro pyridyl group, oxazolo pyridyl group, tetrahydrooxazolo pyridyl group, oxazolo pyridazinyl group, tetrahydrooxazolo pyridazinyl group, pyrrolo thiazolyl group, dihydropyrrolo thiazolyl group, pyrrolo oxazolyl group, dihydropyrrolo oxazolyl group, thieno pyrrolyl group, thiazolo pyrimidinyl group, dihydrothiazolo pyrimidinyl group, 4-oxo-tetrahydrocinnolinyl group, 1,2,4-benzo thiadiazinyl group, 1,1-dihydroxy-2H-1,2,4-benzo thiadiazinyl group, 1,2,4-benzoxa diazinyl group, cyclopentapyranyl group, thieno furanyl group, furo pyranyl group, pyrido oxazinyl group, pyrazolo oxazolyl group, imidazo thiazolyl group, imidazo pyridyl group, tetrahydroimidazo pyridyl group, pyrazino pyridazinyl group, benz isoquinolyl group, furo cinnolyl group, pyrazolo thiazolo pyridazinyl group, tetrahydropyrazolo thiazolo pyridazinyl group, hexahydrothiazolo pyridazino pyridazinyl group, imidazo triazinyl group, oxazolo pyridyl group, benzoxazepinyl group, benzo azepinyl group, tetrahydrobenzo azepinyl group, benzodiazepinyl group, benzo tri azepinyl group, thieno azepinyl group, tetrahydrothieno azepinyl group, thieno diazepinyl group, thieno tri azepinyl group, thiazolo azepinyl group, tetrahydrothiazolo azepinyl group, 4,5,6,7-tetrahydro-5,6-tetramethylene thiazolo pyridazinyl group, 5,6-trimethylene-4,5,6,7-tetrahydrothiazolo pyridazinyl group are nominated, benzothiazolyl group, tetrahydrobenzo thiazolyl group, thieno pyridyl group, tetrahydrothieno pyridyl group, thieno pyrrolyl group, thiazolo pyridyl group, tetrahydrothiazolo pyridyl group, thiazolo pyridazinyl group, tetrahydrothiazolo pyridazinyl group, pyrrolo pyrimidinyl group, dihydropyrrolo pyrimidinyl group, pyrano thiazolyl group, dihydropyrano thiazolyl group, furo pyridyl group, tetrahydrofuro pyridyl group, oxazolo pyridyl group, tetrahydrooxazolo pyridyl group, pyrrolo pyridyl group, dihydropyrrolo pyridyl

group, tetrahydropyrrolo pyridyl group, oxazolo pyridazinyl group, tetrahydrooxazolo pyridazinyl group, pyrrolo thiazolyl group, dihydropyrrolo thiazolyl group, pyrrolo oxazolyl group, dihydropyrrolo oxazolyl group, thiazolo pyrimidinyl group, dihydrothiazolo pyrimidinyl group, benzo azepinyl group, tetrahydrobenzo azepinyl group, thiazolo azepinyl group, tetrahydrothiazolo azepinyl group, thieno azepinyl group, tetrahydrothieno azepinyl group, 4,5,6,7-tetrahydro-5,6-tetramethylene thiazolo pyridazinyl group and 5,6-trimethylene-4,5,6,7-tetrahydrothiazolo pyridazinyl group are preferred, and in particular, tetrahydrobenzo thiazolyl group, tetrahydrothieno pyridyl group, tetrahydrothiazolo pyridyl group, tetrahydrothiazolo pyridazinyl group, dihydropyrrolo pyrimidinyl group, dihydropyrano thiazolyl group, tetrahydrooxazolo pyridyl group, dihydropyrrolo thiazolyl group, 4,5,6,7-tetrahydro-5,6-tetramethylene thiazolo pyridazinyl group and 5,6-trimethylene-4,5,6,7-tetrahydrothiazolo pyridazinyl group are preferred.

It is not limited in particular to form of condensation in aforesaid condensed polycyclic group, and as far as for example thienopyridine is concerned, it may be any of thieno [2,3-b] pyridine, thieno [2,3-c] pyridine, thieno [3,2-b] pyridine, thieno [3,2-c] pyridine, thieno [3,4-b] pyridine, thieno [3,4-c] pyridine, and thieno [2,3-c] pyridine and thieno [3,2-c] pyridine are preferred. As far as thieno pyrrolyl group is concerned, it can be thieno [2,3-b] pyrrolyl, thieno [3,2-b] pyrrolyl group. As far as thiazolopyridine is concerned, it may be any of thiazolo [4,5-b] pyridine, thiazolo [4,5-c] pyridine, thiazolo [5,4-b] pyridine, thiazolo [5,4-c] pyridine, thiazolo [3,4-a] pyridine, thiazolo [3,2-a] pyridine, and thiazolo [4,5-c] pyridine and thiazolo [5,4-c] pyridine are preferred. As far as thiazolo pyridazine is concerned, it may be any of thiazolo [4,5-c] pyridazine, thiazolo [4,5-d] pyridazine, thiazolo [5,4-c] pyridazine, thiazolo [3,2-b] pyridazine, and thiazolo [4,5-d] pyridazine is preferred. As far as pyrrolopyridine is concerned, it may be any of pyrrolo [2,3-b] pyridine, pyrrolo [2,3-c] pyridine, pyrrolo [3,2-b] pyridine, pyrrolo [3,2-c] pyridine, pyrrolo [3,4-b] pyridine, pyrrolo [3,4-c] pyridine, and pyrrolo [2,3-c] pyridine and pyrrolo [3,2-c] pyridine are preferred. As far as pyrrolo pyrimidine is concerned, it may be any of pyrrolo [3,4-d] pyrimidine, pyrrolo [3,2-d] pyrimidine, pyrrolo [2,3-d] pyrimidine, and pyrrolo [3,4-d] pyrimidine is preferred. As far as pyridopyrimidine is concerned, it may be any of pyrido [2,3-d] pyrimidine, pyrido [3,2-d] pyrimidine, pyrido [3,4-d] pyrimidine, pyrido [4,3-d] pyrimidine, pyrido [1,2-c] pyrimidine, pyrido [1,2-a] pyrimidine, and pyrido [3,4-d] pyrimidine and pyrido [4,3-d] pyrimidine are preferred. As far as pyrano thiazole is concerned, it may be any of pyrano [2,3-d] thiazole, pyrano [4,3-d] thiazole, pyrano [3,4-d] thiazole, pyrano [3,2-d] thiazole, and pyrano

[4,3-d] thiazole and pyrano [3,4-d] thiazole are preferred. As far as furo[pyridine] is concerned, it may be any of furo [2,3-b] pyridine, furo [2,3-c] pyridine, furo [3,2-b] pyridine, furo [3,2-c] pyridine, furo [3,4-b] pyridine, furo [3,4-c] pyridine, and furo [2,3-c] pyridine and furo [3,2-c] pyridine are preferred. As far as oxazolo pyridine is concerned, any of oxazolo [4,5-b] pyridine, oxazolo [4,5-c] pyridine, oxazolo [5,4-b] pyridine, oxazolo [5,4-c] pyridine, oxazolo [3,4-a] pyridine, oxazolo [3,2-a] pyridine may be used, and oxazolo [4,5-c] pyridine and oxazolo [5,4-c] pyridine are preferred. As far as oxazolo pyridazine is concerned, any of oxazolo [4,5-c] pyridazine, oxazolo [4,5-d] pyridazine, oxazolo [5,4-c] pyridazine, oxazolo [3,4-b] pyridazine may be used, and oxazolo [4,5-d] pyridazine is preferred. As far as pyrrolo thiazole is concerned, any of pyrrolo [2,1-b] thiazole, pyrrolo [1,2-c] thiazole, pyrrolo [2,3-d] thiazole, pyrrolo [3,2-d] thiazole, pyrrolo [3,4-d] thiazole may be used, and pyrrolo [3,4-d] thiazole is preferred. As far as pyrrolo oxazole is concerned, it may be any of pyrrolo [2,1-b] oxazole, pyrrolo [1,2-c] oxazole, pyrrolo [2,3-d] oxazole, pyrrolo [3,2-d] oxazole, pyrrolo [3,4-d] oxazole, and pyrrolo [3,4-d] oxazole is preferred. As far as benzoazepin is concerned, any of 1H-1-benzoazepin, 1H-2-benzoazepin, 1H-3-benzoazepin may be used, and 1H-3-benzoazepin is preferred. As far as thiazolo [4,5-c] azepin is concerned, it may be any of 4H-thiazolo [4,5-c] azepin, 4H-thiazolo [4,5-d] azepin, 4H-thiazolo [5,4-c] azepin, and 4H-thiazolo [4,5-d] azepin is preferred. As far as thieno [2,3-c] azepin is concerned, it may be any of 4H-thieno [2,3-d] azepin, 4H-thieno [3,2-c] azepin, and 4H-thieno [2,3-d] azepin is preferred.

Moreover, among these heterocyclic groups, in nitrogen containing heterocyclic group, it may form N-oxide. Moreover the position that aforesaid substituent is combined with Q² is not restricted in particular.

, Aforesaid saturated or unsaturated 5-6 membered cyclic hydrocarbon group, saturated or unsaturated 5-7 membered heterocyclic group, saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group or saturated or unsaturated bicyclic or tricyclic condensed heterocyclic group may respectively contain 1-3 substituents, and as the substituent, hydroxy group, halogen atom such as fluorine atom, chlorine atom, bromine atom, iodine atom, halogeno alkyl group in which halogen atom of 1-3 is substituted, amino group, cyano group, amidino group, hydroxy amidino group, straight chain, branched or cyclic C₁-C₆ alkyl group (hereinafter it is called C₁-C₆ alkyl group, and denotes straight, branched or cyclic form, for example, straight or branched chain C₁-C₆ alkyl group such as methyl group, ethyl group,

isopropyl group, tert-butyl group or the like, C₃-C₆ cycloalkyl group such as cyclopropyl group, cyclobutyl group, cyclopentyl group, 1-methylcyclopropyl group or the like), C₃-C₆ cycloalkyl C₁-C₆ alkyl group (for example cyclopropylmethyl group or the like), hydroxy C₁-C₆ alkyl group (for example hydroxyethyl group, 1,1-dimethyl-2-hydroxyethyl group or the like), C₁-C₆ alkoxy group (for example methoxy group, ethoxy group or the like), C₁-C₆ alkoxy C₁-C₆ alkyl group, carboxyl group, C₂-C₆ carboxyalkyl group (for example carboxymethyl group or the like), C₂-C₆ alkoxycarbonyl C₁-C₆ alkyl group (for example methoxycarbonylmethyl group, tert-butoxycarbonyl methyl group or the like), amidino group which C₂-C₆ alkoxycarbonyl group is substituted, C₂-C₆ alkenyl group (for example vinyl group, allyl group or the like), C₂-C₆ alkynyl group (for example ethynyl group, propynyl group or the like), C₂-C₆ alkoxycarbonyl group (for example methoxycarbonyl group, ethoxycarbonyl group, tert-butoxy carbonyl group or the like), amino C₁-C₆ alkyl group (for example aminomethyl group, amino ethyl group or the like), C₁-C₆ alkylamino C₁-C₆ alkyl group (for example N-methylaminomethyl group, N-ethylamino methyl group or the like), di (C₁-C₆ alkyl) amino C₁-C₆ alkyl group (for example N,N-dimethylaminomethyl group, N,N-diethylamino methyl group, N-ethyl-N-methylamino ethyl group or the like), C₂-C₆ alkoxycarbonylamino C₁-C₆ alkyl group (for example methoxycarbonylamino ethyl group, tert-butoxycarbonyl amino ethyl group or the like), C₁-C₆ alkanoyl group (for example formyl group, acetyl group, methyl propionyl group, cyclopentane carbonyl group or the like), C₁-C₆ alkanoyl amino C₁-C₆ alkyl group (for example acetylamino methyl group or the like), C₁-C₆ alkylsulfonyl group (for example methanesulphonyl group or the like), C₁-C₆ alkylsulfonyl amino C₁-C₆ alkyl group (for example methanesulphonyl aminomethyl group or the like), carbamoyl group, C₁-C₆ alkylcarbamoyl group (for example methylcarbamoyl group, ethyl carbamoyl group, isopropyl carbamoyl group, tert-butyl carbamoyl group or the like), N,N-di (C₁-C₆ alkyl) carbamoyl group (for example dimethylcarbamoyl group, diethylcarbamoyl group, methylethyl carbamoyl group or the like), C₁-C₆ alkylamino group (for example N-methylamino group, N-ethylamino group or the like), di (C₁-C₆ alkyl) amino group (for example N,N-dimethylamino group, N,N-diethylamino group, N-ethyl-N-methylamino group or the like), 5-6 membered heterocyclic group including 1 or 2 or more of same or different nitrogen, oxygen or sulfur atom (for example pyrrolidinyl group, piperidinyl group, piperazinyl group, morpholinyl group, pyridyl group, pyrimidinyl group, tetrahydropyranyl group or the like), aforesaid 5-6 membered heterocyclic group -C₁-C₄ alkyl group (for example morpholinomethyl group or the like) or aforesaid 5-6 membered heterocyclic group-amino-C₁-C₄ alkyl group (for example N-[oxazol-2-yl] aminomethyl group or the like) are nominated.

If embodiment example of Q^1 is denoted, bicyclic heterocyclic group such as for example 5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridin-2-yl group, 4,5,6,7-tetrahydrothiazolo [5,4-c] pyridin-2-yl group, 5-cyclopropyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridin-2-yl group, 5-carboxymethyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridin-2-yl group, 5-butyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridin-2-yl group, 5-(4-pyridyl)-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridin-2-yl group, 5-methyl-4,5,6,7-tetrahydrothiazolo [4,5-c] pyridin-2-yl group, 6-methyl-4,5,6,7-tetrahydrothieno [2,3-c] pyridin-2-yl group, 5-methyl-4,5,6,7-tetrahydrooxazolo [5,4-c] pyridin-2-yl group, 5-methyl-4,6-dihydro-5H-pyrrolo [3,4-d] thiazol-2-yl group, 5,7-dihydro-6-methyl pyrrolo [3,4-d] pyrimidine -2-yl group, 5,6-dimethyl-4,5,6,7-tetrahydrothiazolo [4,5-d] pyridazin-2-yl group, 5,6-dimethyl-4,5,6,7-tetrahydrooxazolo [4,5-d] pyridazin-2-yl group, 5-dimethylamino-4,5,6,7-tetrahydrobenzo [d] thiazol-2-yl group, 5-(4-pyridyl)-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridin-2-yl group, 6,7-dihydro-4H-pyrano [4,3-d] thiazol-2-yl group and the like, pyridyl group such as for example 4-pyridyl group, 2-pyridyl group and the like, dihydrooxazolyl group such as for example 4,5-dihydro-oxazol-2-yl group and the like, 5-6 membered heterocyclic group such as for example 4-[N-(4,5-dihydro-oxazol-2-yl)-N-methylaminomethyl] thiophen-2-yl group, 4-[N-(4,5-dihydro-oxazol-2-yl)-N-methylaminomethyl]-3-chlorothiophen-2-yl group, 5-(N-methylaminomethyl) thiazol-2-yl group, 5-(N-methylaminomethyl) thiophen-2-yl group, 5-(N,N-dimethylaminomethyl) thiazol-2-yl group, 5-(N,N-dimethylaminomethyl) thiophen-2-yl group, 5-(N,N-dimethylaminomethyl) pyridin-2-yl group and the like are nominated. Wherein, these examples do not restrict Q^1 .

About group Q^2

Group Q^2 denotes single bond, having divalent saturated or unsaturated 5-6 membered cyclic hydrocarbon group which may have substituent, divalent saturated or unsaturated 5-7 membered heterocyclic group which may have substituent, divalent saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group which may have substituent or divalent saturated or unsaturated bicyclic or tricyclic condensed polycyclic group which may have substituent.

In group Q^2 , divalent saturated or unsaturated 5-6 membered cyclic hydrocarbon group denotes the one in which saturated or unsaturated 5-6 membered cyclic hydrocarbon described in explanation of Q^4 in

general formula (1) becomes divalent group, and cyclohexylene group, cyclohexenylene group, phenylene group can be nominated for embodiment example, and cyclohexylene group and phenylene group are preferred.

Divalent saturated or unsaturated 5-7 membered heterocyclic group denotes the one in which saturated or unsaturated 5-7 membered heterocycle described in explanation of Q^4 in general formula (1) becomes divalent group, and as embodiment example, the one in which furan, pyrrole, thiophene, pyrazole, imidazole, oxazole, oxazolidine, thiazole, thiadiazole, furazane, pyran, pyridine, pyrimidine, pyridazine, pyrrolidine, piperazine, piperidine, oxazine, oxadiazine, morpholine, thiazine, thiadiazine, thiomorpholine, tetrazole, triazole, triazine, azepin, diazepine, triazepine and the like becomes divalent group can be proposed, wherein the one in which pyrazole, imidazole, oxazolyl, thiazole, thiadiazole, furazane, pyridine, pyrimidine, pyridazine, pyrrolidine, piperazine, piperidine, triazole, triazine, azepin, diazepine and triazepine becomes divalent group can be proposed as preferred examples.

Divalent saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group denotes the one in which saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon described in explanation of Q^4 in general formula (1) becomes divalent group, and as embodiment example, the one in which indene, indane, naphthalene, tetrahydronaphthalene, anthracene, phenanthrene and the like becomes divalent group can be proposed, and the one in which indane and naphthalene becomes divalent group can be proposed as preferred example.

Divalent saturated or unsaturated bicyclic or tricyclic condensed polycyclic group denotes the one in which saturated or unsaturated bicyclic or tricyclic condensed heterocycle described in explanation of Q^4 in general formula (1) becomes divalent group, as embodiment example, the one in which benzofuran, benzo thiophene, indole, iso indole, indazole, quinoline, tetrahydroquinoline, isoquinoline, tetrahydroisoquinoline, quinazoline, dihydroquinazoline, tetrahydroquinazoline, quinoxaline, tetrahydroquinoxaline, cinnoline, tetrahydrocinnoline, indolizine, tetrahydroindolizin, benzothiazole, tetrahydrobenzo thiazole, naphthyridine, tetrahydronaphthyridine, thienopyridine, tetrahydrothieno pyridine, thiazolopyridine, tetrahydrothiazolopyridine, thiazolo pyridazine, tetrahydrothiazolo pyridazine, pyrrolopyridine, dihydropyrrolo pyridine, tetrahydropyrrolo pyridine, pyrrolo pyrimidine, dihydropyrrolo pyrimidine, dihydropyrrolo quinazoline, pyrano thiazole, dihydropyrano thiazole,

furopyridine, tetrahydrofuro pyridine, oxazolo pyridine, tetrahydrooxazolo pyridine, oxazolo pyridazine, tetrahydrooxazolo pyridazine, pyrrolo thiazole, dihydropyrrolo thiazole, pyrrolo oxazole, dihydropyrrolo oxazole, benzoazepin and the like becomes divalent group can be nominated , and the one in which benzofuran, benzo thiophene, indole, indazole, quinoline, isoquinoline, tetrahydroisoquinoline, benzothiazole, naphthyridine, thienopyridine, thiazolopyridine, tetrahydrothiazolopyridine, thiazolo pyridazine, pyrrolopyridine, tetrahydropyrrolo pyridine, pyridopyrimidine, pyrano thiazole, dihydropyrano thiazole, furopyridine, oxazolo pyridine, oxazolo pyridazine, pyrrolo thiazole, dihydropyrrolo thiazole, pyrrolo oxazole and dihydropyrrolo oxazole becomes divalent group can be proposed as preferred example . It is not limited in particular to form of condensation in aforesaid condensed polycyclic group, as far as for example naphthyridine is concerned, any of 1,5-, 1,6-, 1,7-, 1,8-, 2,6-, 2,7-naphthyridine may be used, as far as thienopyridine is concerned, any of thieno [2,3-b] pyridine, thieno [2,3-c] pyridine, thieno [3,2-b] pyridine, thieno [3,2-c] pyridine, thieno [3,4-b] pyridine, thieno [3,4-c] pyridine may be used, as far as thiazolopyridine is concerned, any of thiazolo [4,5-b] pyridine, thiazolo [4,5-c] pyridine, thiazolo [5,4-b] pyridine, thiazolo [5,4-c] pyridine, thiazolo [3,4-a] pyridine, thiazolo [3,2-a] pyridine may be used, as far as thiazolo pyridazine is concerned, any of thiazolo [4,5-c] pyridazine, thiazolo [4,5-d] pyridazine, thiazolo [5,4-c] pyridazine, thiazolo [3,2-b] pyridazine may be used, as far as pyrrolopyridine is concerned, any of pyrrolo [2,3-b] pyridine, pyrrolo [2,3-c] pyridine, pyrrolo [3,2-b] pyridine, pyrrolo [3,2-c] pyridine, pyrrolo [3,4-b] pyridine, pyrrolo [3,4-c] pyridine may be used, as far as pyrrolo pyrimidine is concerned, any of pyrrolo [3,4-d] pyrimidine, pyrrolo [3,2-d] pyrimidine, pyrrolo [2,3-d] pyrimidine may be used, as far as pyridopyrimidine is concerned, any of pyrido [2,3-d] pyrimidine, pyrido [3,2-d] pyrimidine, pyrido [3,4-d] pyrimidine may be used, as far as pyrano thiazole is concerned, any of pyrano [2,3-d] thiazole, pyrano [4,3-d] thiazole, pyrano [3,4-d] thiazole, pyrano [3,2-d] thiazole may be used, as far as furopyridine is concerned, any of furo [2,3-b] pyridine, furo [2,3-c] pyridine, furo [3,2-b] pyridine, furo [3,2-c] pyridine, furo [3,4-b] pyridine, furo [3,4-c] pyridine may be used, as far as oxazolo pyridine is concerned, any of oxazolo [4,5-b] pyridine, oxazolo [4,5-c] pyridine, oxazolo [5,4-b] pyridine, oxazolo [5,4-c] pyridine, oxazolo [3,4-a] pyridine, oxazolo [3,2-a] pyridine may be used, as far as oxazolo pyridazine is concerned, any of oxazolo [4,5-c] pyridazine, oxazolo [4,5-d] pyridazine, oxazolo [5,4-c] pyridazine, oxazolo [3,4-b] pyridazine may be used, as far as pyrrolo thiazole is concerned, any of pyrrolo [2,1-b] thiazole, pyrrolo [1,2-c] thiazole, pyrrolo [3,2-d] thiazole, pyrrolo [3,4-d] thiazole may be used, as far as pyrrolo oxazole is concerned, any of pyrrolo [2,1-b] oxazole, pyrrolo [1,2-c] oxazole, pyrrolo [2,3-d]

oxazole, pyrrolo [3,2-d] oxazole, pyrrolo [3,4-d] oxazole may be used, and moreover it may be used other than these condensation form.

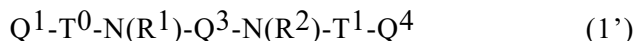
Aforesaid divalent saturated or unsaturated 5-6 membered cyclic hydrocarbon group, divalent saturated or unsaturated 5-7 membered heterocyclic group, divalent saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group and divalent saturated or unsaturated bicyclic or tricyclic condensed polycyclic group may respectively contain 1-3 substituents, and the substituent, that might hydroxy group, halogen atom such as fluorine atom, chlorine atom, bromine atom, iodine atom, halogeno alkyl group in which 1-3 halogen atom is substituted, amino group, cyano group, amino alkyl group, amidino group, hydroxy amidino group straight chain, branched or cyclic 1-6 C alkyl group (for example methyl group, ethyl group or the like), straight chain, branched or cyclic 1-6 C alkoxy group (for example methoxy group, ethoxy group or the like), amidino group in which straight chain, branched or cyclic 2-7 C alkoxycarbonyl group is substituted (for example methoxycarbonyl amidino group, ethoxycarbonyl amidino group or the like), straight chain, branched or cyclic 2-6 C alkenyl group (for example vinyl group, allyl group or the like), straight or branched chain 2-6 C alkynyl group (for example ethynyl group, propynyl group or the like), straight chain, branched or cyclic 2-6 C alkoxycarbonyl group (for example methoxycarbonyl group, ethoxycarbonyl group or the like) or carbamoyl group are nominated.

Among the aforesaid Q^2 , Single bond, divalent saturated or unsaturated 5-6 membered cyclic hydrocarbon group which may have substituent, divalent saturated or unsaturated 5-7 membered heterocyclic group which may have substituent and divalent saturated or unsaturated bicyclic or tricyclic condensed polycyclic group which may have substituent are preferred. Wherein single bond, divalent saturated or unsaturated 5-6 membered cyclic hydrocarbon group, divalent saturated or unsaturated 5-7 membered heterocyclic group are more preferred.

Moreover, when group Q^1 is saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group which may have substituent or saturated or unsaturated bicyclic or tricyclic condensed polycyclic group which may have substituent, group Q^2 is preferably to be single bond . Wherein, in aforesaid combination, the case of Q^2 is single bond denotes the general formula (1)



(wherein, R^1 , R^2 , Q^1 , Q^2 , Q^3 , Q^4 , T^0 and T^1 have the same aforesaid definition) becomes the following general formula (1')



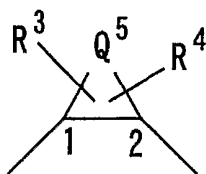
(wherein, Q^1 denotes an aforesaid bicyclic or tricyclic condensed hydrocarbon group or bicyclic or tricyclic condensed polycyclic group, and R^1 , R^2 , Q^3 , Q^4 , T^0 and T^1 have the same aforesaid definition).

More preferably, group Q^1 is thieno pyridyl group which may have substituent, tetrahydrothieno pyridyl group which may have substituent, thiazolo pyridyl group which may have substituent, tetrahydrothiazolo pyridyl group which may have substituent, thiazolo pyridazinyl group which may have substituent, tetrahydrothiazolo pyridazinyl group which may have substituent, pyrano thiazolyl group which may have substituent, dihydropyrano thiazolyl group which may have substituent, furo pyridyl group which may have substituent, tetrahydrofuro pyridyl group which may have substituent, oxazolo pyridyl group which may have substituent, tetrahydrooxazolo pyridyl group which may have substituent, pyrrolo pyridyl group which may have substituent, dihydropyrrolo pyridyl group which may have substituent, tetrahydropyrrolo pyridyl group which may have substituent, pyrrolo pyrimidinyl group which may have substituent, dihydropyrrolo pyrimidinyl group which may have substituent, oxazolo pyridazinyl group which may have substituent, tetrahydrooxazolo pyridazinyl group which may have substituent, pyrrolo thiazolyl group which may have substituent, dihydropyrrolo thiazolyl group which may have substituent, pyrrolo oxazolyl group which may have substituent, dihydropyrrolo oxazolyl group which may have substituent, benzothiazolyl group which may have substituent, tetrahydrobenzo thiazolyl group which may have substituent, thiazolo pyrimidinyl group which may have substituent, dihydrothiazolo pyrimidinyl group which may have substituent, it is benzo azepinyl group which may have substituent, tetrahydrobenzo azepinyl group which may have substituent, thiazolo azepinyl group which may have substituent, tetrahydrothiazolo azepinyl group which may have substituent, thieno azepinyl group which may have substituent, tetrahydrothieno azepinyl group which may have substituent, 4,5,6,7-tetrahydro-5,6-tetramethylene thiazolo pyridazinyl group which may have substituent or 5,6-trimethylene-4,5,6,7-tetrahydrothiazolo pyridazinyl group which may have substituent, and the one that group Q^2 is single bond is preferred.

Moreover, when group Q^1 is saturated or unsaturated 5-7 membered heterocyclic group which may have substituent or saturated or unsaturated 5-6 membered cyclic hydrocarbon group which may have substituent, group Q^2 is preferably to be divalent saturated or unsaturated 5-7 membered heterocyclic group which may have substituent or divalent saturated or unsaturated 5-6 membered cyclic hydrocarbon group which may have substituent, as group Q^1-Q^2 -, it can nominate as preferred example of 4-(4-pyridyl) phenyl group, 4-(2-pyridyl) phenyl group, 5-(4-pyridyl) thiazolyl group, 1-(4-pyridyl) piperidinyll group, 4-(4-pyridyl) piperidyl group, 4-hydroxy-1-(4-pyridyl) piperidin-4-yl group, biphenyl group, 4-(2-amino sulphonyl phenyl) phenyl group, 4-(2-amidino phenyl) phenyl group, 4-(2-methyl sulphonyl phenyl) phenyl group, 4-(2-aminomethyl phenyl) phenyl group, 4-(2-carbamoyl phenyl) phenyl group, 4-(2-imidazolyl) phenyl group, 4-(1-methyl-2-imidazolyl) phenyl group, 4-(2,3,4,5-tetrahydropyrimidine-2-yl) phenyl group, 4-(1-methyl-2,3,4,5-tetrahydropyrimidine-2-yl) phenyl group, 4-(5-tetrazolyl) phenyl group, 1-(4-pyridyl) piperidin-4-yl group, 3-(4-piperidyl) isoxazolin-5-yl group, 3-(4-amidino phenyl) isoxazolin-5-yl group, 3-(4-piperidyl) iso oxazolidin-5-yl group, 3-(4-amidino phenyl) iso oxazolidin-5-yl group, 2-(4-piperidyl)-1,3,4-thiadiazol-5-yl group, 2-(4-aminophenyl)-1,3,4-oxadiazol-5-yl group, 4-(4-piperidyl) piperidin-1-yl group, 4-(4-piperidyl) piperazin-1-yl group, 4-(4-piperazinyl) piperazin-1-yl group, 1-(4-pyrimidinyl) piperidin-1-yl group, 1-(2-methylprimidine-4-yl) piperidin-4-yl group, 1-(4-pyrimidinyl) pyrrolidin-3-yl group, 1-(4-methylprimidine-6-yl) piperazin-4-yl group, 1-(2-methylprimidine-4-yl) pyrrolidin-4-yl group, 1-(6-chloropyrimidin-4-yl) piperidin-4-yl group, 5-(4-chlorophenyl) thiophen-2-yl group, 2-(4-chlorophenyl) thiazol-4-yl group, 3-(4-chlorophenyl)-1H-pyrrole-2-yl group, 4-(4-pyrimidinyl) phenyl group, 4-(4-imidazolyl) phenyl group or the like.

About group Q^3

Group Q^3 denotes the following group

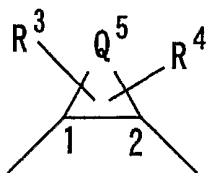


(in this group, Q^5 denotes 1-8 C alkylene group, 2-8 C alkenylene group or group-(CH₂)_m-CH₂-A-CH₂-(CH₂)_n-) (in this group, m and n each independently denote an integer of 0, 1-3, and A denotes oxygen

atom, nitrogen atom, sulfur atom, -SO-, -SO₂-, -NH-, -O-NH-, -NH-NH-, -S-NH-, -SO-NH- or SO₂-NH-, and 1 and 2 denote position), R³ and R⁴ is substituted on carbon atom, nitrogen atom or sulfur atom on ring including Q⁵ and each independently denote hydrogen atom, hydroxy group, alkyl group, alkenyl group, alkynyl group, halogen atom, halogeno alkyl group, cyano group, cyano alkyl group, amino group, amino alkyl group, N-alkylamino alkyl group, N,N-dialkylaminoalkyl group, acyl group, acyl alkyl group, acylimino-group which may have substituent, alkoxyimino group, hydroxyimino group, acylamino alkyl group, alkoxy group, alkoxyalkyl group, hydroxyalkyl group, carboxyl group, carboxyalkyl group, alkoxy-carbonyl group, alkoxy-carbonyl alkyl group, alkoxy-carbonyl alkylamino group, carboxyalkyl amino group, alkoxy-carbonylamino group, alkoxy-carbonylamino alkyl group, carbamoyl group, N-alkylcarbamoyl group which may contain substituent on alkyl group, N,N-dialkyl carbamoyl group which may contain substituent on alkyl group, N-alkenyl carbamoyl group, N-alkenyl carbamoyl alkyl group, N-alkenyl-N-alkylcarbamoyl group, N-alkenyl-N-alkylcarbamoyl alkyl group, N-alkoxy carbamoyl group, N-alkyl-N-alkoxy carbamoyl group, N-alkoxy carbamoyl alkyl group, N-alkyl-N-alkoxy carbamoyl alkyl group, carbazoyl group optionally substituted by 1-3 alkyl group, alkylsulfonyl group, alkylsulfonyl alkyl group, 3-6 membered heterocyclic carbonyl group which may have substituent, carbamoyl alkyl group, N-alkylcarbamoyl alkyl group which may contain substituent on alkyl group, N,N-dialkyl carbamoyl alkyl group which may contain substituent on alkyl group, carbamoyloxy alkyl group, N-alkylcarbamoyloxy alkyl group, N,N-dialkyl carbamoyloxy alkyl group, 3-6 membered heterocyclic carbonyl alkyl group which may have substituent, 3-6 membered heterocyclic carbonyl oxy alkyl group which may have substituent, aryl group, aralkyl group, heteroaryl group, heteroaryl alkyl group, alkylsulfonyl amino group, arylsulfonylamino group, alkylsulfonyl amino alkyl group, arylsulfonylamino alkyl group, alkylsulfonyl aminocarbonyl group, arylsulfonylamino carbonyl group, alkylsulfonyl aminocarbonyl alkyl group, arylsulfonylamino carbonyl alkyl group, oxo group, carbamoyloxy group, aralkyloxy group, carboxyalkyl oxy group, acyl oxy group, acyloxyalkyl group, aryl sulphonyl group, alkoxy-carbonyl alkylsulfonyl group, carboxyalkyl sulphonyl group, alkoxy-carbonyl acyl group, alkoxyalkyl oxycarbonyl group, hydroxy acyl group, alkoxy acyl group, halogeno acyl group, carboxy acyl group, aminoacyl group, acyloxyacyl group, acyloxyalkyl sulphonyl group, hydroxyalkyl sulphonyl group, alkoxyalkyl sulphonyl group, 3-6 membered heterocyclic sulphonyl group which may have substituent, N-alkylamino acyl group, N,N-dialkylamino acyl group, N,N-dialkyl carbamoyl acyl group which may contain substituent on alkyl group, N,N-dialkyl carbamoyl alkylsulfonyl group which may contain substituent on alkyl group or alkylsulfonyl acyl group, or R³ and

R^4 bond together and denote 1-5 C alkylene group, 2-5 C alkenylene group, 1-5 C alkylene dihydroxy group or carbonyldioxy group).

About following group, it is described in greater detail.



(in this group, Q^5 , R^3 and R^4 have the same aforesaid meanings, and 1 and 2 denote position).

Part of cyclic structure including aforesaid group Q^5 is 3-10 membered divalent cyclic hydrocarbon group which may contain 1 double bond or 5-12 membered divalent heterocyclic group containing 1-2 heteroatom. However, 3-8 membered divalent cyclic hydrocarbon group or 5-8 membered divalent heterocyclic group is preferred, and 5-7 membered divalent cyclic hydrocarbon group or 5-7 membered divalent heterocyclic group is more preferred. Wherein the one that Q^5 is 3-6 C alkylene group or group-(CH_2) m - CH_2 -A- CH_2 -(CH_2) n - (in this group, m and n each independently denote 0 or 1, and A is the same as above) is preferred. The one that Q^5 is 4 C alkylene group is preferred in particular.

Moreover, this cyclic hydrocarbon group or heterocyclic group can take cis and trans configuration in relation of 1 and 2 position, but trans is preferred in cases of 5 membered and both of cis and trans is preferred in case of 6-7 membered.

Aforesaid substituent R^3 and R^4 are described in greater detail. Halogen atom denotes fluorine atom, chlorine atom, bromine atom, iodine atom. As alkyl group, straight, branched chain or cyclic C_1 - C_6 alkyl group (for example methyl group, cyclopropyl group, isobutyl group or the like) is proposed, and as halogeno alkyl group, the group in which halogen atom of 1-3 is substituted on aforesaid alkyl group (for example chloromethyl group, 1-bromoethyl group, trifluoromethyl group or the like) is nominated. As cyano alkyl group, the group which one cyano group is substituted on aforesaid C_1 - C_6 alkyl group (for example cyanomethyl group, 1-cyanoethyl group or the like) is nominated. As far as alkenyl group is concerned, group of branched or straight chain of carbon number 2-6 containing one double bond (for example vinyl group, allyl group or the like) is nominated. As far as alkynyl group is concerned, group of

branched or straight chain of carbon number 2-6 containing one triple bond (for example ethynyl group, propynyl group or the like) is nominated. As acyl group, C₁-C₆ alkanoyl group (for example formyl group, acetyl group or the like), C₇-C₁₅ aroyl group such as for example benzoyl group, naphthoyl group and the like or aryl alkanoyl group which one C₆-C₁₄ aryl group is substituted on aforesaid C₁-C₆ alkanoyl group (for example phenacetyl group or the like) is nominated. As acyl alkyl group, the one which one of aforesaid acyl group is substituted on aforesaid C₁-C₆ alkyl group (for example acetyl methyl group or the like) is nominated. As alkoxy group, straight, branched chain or cyclic C₁-C₆ alkoxy group (for example methoxy group, cyclo propoxy group, isopropoxy group or the like) is nominated. As alkoxyalkyl group, the one which one of aforesaid C₁-C₆ alkoxy group is substituted on aforesaid C₁-C₆ alkyl group (for example methoxymethyl group, ethoxymethyl group or the like) is nominated. As hydroxyalkyl group, the one which one hydroxy group is substituted on aforesaid C₁-C₆ alkyl group (for example hydroxymethyl group, 1-hydroxyethyl group or the like) is nominated. As carboxyalkyl group, the one which one carboxyl group is substituted on aforesaid C₁-C₆ alkyl group (for example carboxymethyl group, 1-carboxyethyl group or the like) is nominated. As alkoxy carbonyl group, group consisting from the aforesaid C₁-C₆ alkoxy group and carbonyl group (for example methoxycarbonyl group, ethoxycarbonyl group or the like) is nominated. As alkoxy carbonyl alkyl group, the one which one of aforesaid alkoxy carbonyl group is substituted on aforesaid C₁-C₆ alkyl group (for example methoxycarbonyl ethyl group, ethoxycarbonyl ethyl group or the like) is nominated. As carbamoyl alkyl group, the group that carbamoyl group is substituted on the aforesaid C₁-C₆ alkyl group (for example carbamoylmethyl group, carbamoyl ethyl group) is nominated.

As far as heteroaryl group is concerned, same groups as heteroaryl group in explanation of Q⁴ in general formula (1) is nominated. As far as heteroaryl alkyl group is concerned, the one in which one of aforesaid heteroaryl group is substituted on aforesaid C₁-C₆ alkyl group (for example thienylmethyl group, pyridyl ethyl group or the like) is nominated. As far as aryl group is concerned, a group of carbon number 6-14 such as for example phenyl group, naphthyl group and the like is proposed, and aryl group may be substituted with 1-3 groups selected from aforesaid C₁-C₆ alkyl group, aforesaid C₁-C₆ alkanoyl group, hydroxy group, nitro group, cyano group, halogen atom, aforesaid C₂-C₆ alkenyl group, aforesaid C₂-C₆ alkynyl group, aforesaid C₁-C₆ halogeno alkyl group, aforesaid C₁-C₆ alkoxy group, carboxy group, carbamoyl group, aforesaid C₁-C₆ alkoxy carbonyl group. As aralkyl group, the one in which one of aforesaid C₆-C₁₄ aryl group is substituted on aforesaid C₁-C₆ alkyl group (for example benzyl group,

phenethyl group or the like) is nominated. Moreover, in aforesaid explanation, position of substitution is not restricted in particular. As acylamino group which may contain substituent, other than the one in which aforesaid C₁-C₆ acyl group is substituted on amino group (for example formyl amino group, acetylamino group or the like), acyl group in which one or plural of halogen atom, hydroxy group, C₁-C₆ alkoxy group, amino group, N-C₁-C₆ alkylamino group, N,N-di-C₁-C₆ alkylamino group, carboxyl group, C₂-C₆ alkoxy carbonyl group and the like is substituted on acyl group (for example 2-methoxyacetyl amino group, 3-amino propionyl amino group or the like) is nominated. As acylamino alkyl group, the one in which the aforesaid C₁-C₆ acylamino-group is substituted on aforesaid C₁-C₆ alkyl group (for example formyl aminomethyl group, acetylamino methyl group or the like) is nominated. As amino alkyl group, the one in which amino group is substituted on aforesaid C₁-C₆ alkyl group (for example aminomethyl group, 1-amino ethyl group or the like) is nominated. As N-alkylamino alkyl group, the one in which one of C₁-C₆ alkyl group is substituted on nitrogen atom of amino-C₁-C₆ alkyl group (for example N-methylaminomethyl group, N-methylamino ethyl group or the like) is nominated. As N,N-dialkylaminoalkyl group, the one in which two of C₁-C₆ alkyl group is substituted on nitrogen atom of amino-C₁-C₆ alkyl group (for example N,N-dimethylaminomethyl group, N-ethyl-N-methylamino ethyl group or the like) is nominated. As N-alkenyl carbamoyl group, the one in which straight or branched chain C₂-C₆ alkenyl group is substituted on carbamoyl group (for example allyl carbamoyl group or the like) is nominated. As N-alkenyl carbamoyl alkyl group, the one in which aforesaid N-C₂-C₆ alkenyl carbamoyl group is substituted on C₁-C₆ alkyl group (for example allyl carbamoylethyl group or the like) is nominated. As N-alkenyl-N-alkylcarbamoyl group, the one in which straight or branched chain C₁-C₆ alkyl group is substituted on nitrogen atom of aforesaid N-C₂-C₆ alkenyl carbamoyl group (for example N-allyl-N-methylcarbamoyl group or the like) is nominated. As N-alkenyl-N-alkylcarbamoyl alkyl group, the one in which straight or branched chain C₁-C₆ alkyl group is substituted on nitrogen atom of aforesaid N-C₂-C₆ alkenyl carbamoyl alkyl group (for example N-allyl-N-methylcarbamoyl methyl group or the like) is nominated. As N-alkoxy carbamoyl group, the one in which straight or branched chain C₁-C₆ alkoxy group is substituted on carbamoyl group (for example methoxy carbamoyl group or the like) is nominated. As N-alkoxy carbamoyl alkyl group, the one in which aforesaid N-C₁-C₆ alkoxy carbamoyl group is substituted on straight or branched chain C₁-C₆ alkyl group (for example methoxy carbamoylmethyl group or the like) is nominated. As N-alkyl-N-alkoxy carbamoyl group, the one in which straight or branched chain C₁-C₆ alkoxy group and C₁-C₆ alkyl group are substituted on carbamoyl group (for example N-ethyl-N-methoxy carbamoyl group or

the like) is nominated. As N-alkyl-N-alkoxy carbamoyl alkyl group, the one in which aforesaid N-C₁-C₆ alkyl-N-C₁-C₆ alkoxy carbamoyl group is substituted on straight or branched chain C₁-C₆ alkyl group (for example N-ethyl-N-methoxy carbamoylmethyl group or the like) is nominated. As carbazoyl group optionally-substituted by 1-3 alkyl group, other than carbazoyl group, the carbazoyl group in which 1-3 straight or branched chain C₁-C₆ alkyl group is substituted (for example 1-methyl carbazoyl group, 1,2-dimethyl carbazoyl group or the like) is nominated. As alkylsulfonyl group, straight, branched chain or cyclic C₁-C₆ alkylsulfonyl group (for example methanesulphonyl group or the like) is nominated. As alkylsulfonyl alkyl group, the one in which aforesaid C₁-C₆ alkylsulfonyl group is substituted on straight or branched chain C₁-C₆ alkyl group (for example methanesulphonyl methyl group or the like) is nominated. As alkoxyimino group, C₁-C₆ alkoxyimino group (for example methoxyimino group, ethoxy imino group or the like) is nominated. As alkoxy-carbonyl alkylamino group, the one in which one of aforesaid C₁-C₆ alkoxy-carbonyl alkyl group is substituted on amino group (for example methoxycarbonylmethyl amino group, ethoxycarbonyl propylamino group or the like) is nominated. As carboxyalkyl amino group, the one in which one of aforesaid carboxy C₁-C₆ alkyl group is substituted on amino group (for example carboxymethyl amino group, carboxyethyl amino group or the like) is proposed. As alkoxy-carbonylamino group, the one in which one of aforesaid C₁-C₆ alkoxy-carbonyl group is substituted on amino group (for example methoxycarbonylamino group, tert-butoxycarbonyl amino group or the like) is nominated. As alkoxy-carbonylamino alkyl group, the one in which one of aforesaid C₁-C₆ alkoxy-carbonylamino group is substituted on aforesaid alkyl group (for example methoxycarbonylamino methyl group, tert-butoxycarbonyl amino ethyl group or the like) is nominated. N-alkylcarbamoyl group which may contain substituent on alkyl group denotes carbamoyl group substituted by straight, branched chain or cyclic C₁-C₆ alkyl group which may be substituted by hydroxy group, amino group, N-C₁-C₆ alkylamino group, amidino group, halogen atom, carboxyl group, cyano group, carbamoyl group, C₁-C₆ alkoxy group, C₁-C₆ alkanoyl group, C₁-C₆ alkanoyl amino group, C₁-C₆ alkylsulfonyl amino group and the like, and for example N-methylcarbamoyl group, N-ethyl carbamoyl group, N-isopropyl carbamoyl group, N-cyclopropyl carbamoyl group, N-(2-hydroxyethyl) carbamoyl group, N-(2-fluoroethyl) carbamoyl group, N-(2-cyanoethyl) carbamoyl group, N-(2-methoxyethyl) carbamoyl group, N-carboxymethyl carbamoyl group, N-(2-amino ethyl) carbamoyl group, N-(2-amidino ethyl) carbamoyl group or the like are nominated. N,N-dialkyl carbamoyl group which may contain substituent on alkyl group denotes carbamoyl group substituted by two of straight, branched chain or cyclic C₁-C₆ alkyl group which may be substituted by hydroxy group, amino group, N-

C₁-C₆ alkylamino group, amidino group, halogen atom, carboxyl group, cyano group, carbamoyl group, C₁-C₆ alkoxy group, C₁-C₆ alkanoyl group, C₁-C₆ alkanoyl amino group, C₁-C₆ alkylsulfonyl amino group and the like, and for example N,N-dimethylcarbamoyl group, N,N-diethylcarbamoyl group, N-ethyl-N-methylcarbamoyl group, N-isopropyl-N-methylcarbamoyl group, N-(2-hydroxyethyl)-N-methylcarbamoyl group, N,N-bis (2-hydroxyethyl) carbamoyl group, N,N-bis (2-fluoroethyl) carbamoyl group, N-(2-cyanoethyl)-N-methylcarbamoyl group, N-(2-methoxyethyl)-N-methylcarbamoyl group, N-carboxymethyl-N-methylcarbamoyl group, N,N-bis (2-amino ethyl) carbamoyl group or the like are nominated. As N-alkylcarbamoyl alkyl group which may contain substituent on alkyl group, the one in which N-alkylcarbamoyl group which may contain substituent on aforesaid C₁-C₆ alkyl group is substituted on straight or branched chain C₁-C₆ alkyl group (for example N-methylcarbamoyl methyl group, N-[2-hydroxyethyl] carbamoylmethyl group or the like) is nominated. As N,N-dialkyl carbamoyl alkyl group which may contain substituent on alkyl group, the one in which N,N-dialkyl carbamoyl group which may contain substituent on aforesaid C₁-C₆ alkyl group is substituted on straight or branched chain C₁-C₆ alkyl group (for example N,N-dimethylcarbamoylmethyl group, N-[2-hydroxyethyl]-N-methylcarbamoyl methyl group or the like) is nominated. 3-6 membered heterocycle carbonyl group which may have substituent is a group constituted from saturated or unsaturated heterocyclic ring and carbonyl group, and heterocyclic ring denotes 3-6 membered heterocyclic ring which may include 1-3 heteroatom (nitrogen atom, oxygen atom, sulfur atom and the like), and the heterocyclic ring may have substituent such as hydroxy group, halogen atom, amino group, C₁-C₆ alkyl group and the like, and as embodiments, aziridinyl carbonyl group, azetidiny carbonyl group, 3-hydroxy azetidiny carbonyl group, 3-methoxy azetidiny carbonyl group, pyrrolidinylcarbonyl group, 3-hydroxy pyrrolidinylcarbonyl group, 3-fluoro pyrrolidinylcarbonyl group, piperidinyl carbonyl group, piperazinyl carbonyl group, morpholinyl carbonyl group, tetrahydropyranly carbonyl group, pyridyl carbonyl group, furoyl group, thiophenecarbonyl group and the like are nominated. As 3-6 membered heterocyclic carbonyl alkyl group which may have substituent, the one in which one of aforesaid 3-6 membered heterocyclic carbonyl group which may contain substituent is substituted on aforesaid C₁-C₆ alkyl group (for example azetidiny carbonyl methyl group, pyrrolidinylcarbonyl ethyl group or the like) is nominated. As 3-6 membered heterocyclic carbonyl oxy alkyl group which may have substituent, the one in which one of 3-6 membered heterocycle carbonyl oxy group which is constituted from 3-6 membered heterocycle carbonyl group which may contain aforesaid substituent and oxygen atom is substituted on aforesaid C₁-C₆ alkyl group (for example piperidinyl carbonyl oxy ethyl group, morpholinyl carbonyl oxymethyl

group or the like) is nominated. As carbamoyloxy alkyl group, the one in which one carbamoyloxy group consisted from carbamoyl group and oxygen atom is substituted on aforesaid C₁-C₆ alkyl group (for example carbamoyloxy methyl group, carbamoyloxy ethyl group or the like) is nominated. As N-alkylcarbamoyloxy alkyl group, the one in which one N-alkylcarbamoyloxy group constituted from N-alkylcarbamoyl group which may contain substituent on aforesaid C₁-C₆ alkyl group and oxygen atom is substituted on aforesaid C₁-C₆ alkyl group (for example N-methylcarbamoyloxymethyl group, N-methylcarbamoyloxy ethyl group or the like) is nominated. As N,N-dialkyl carbamoyloxy alkyl group, the one in which one N,N-dialkyl carbamoyloxy group constructed from N,N-dialkyl carbamoyl group which may contain substituent on aforesaid C₁-C₆ alkyl group and oxygen atom is substituted to aforesaid C₁-C₆ alkyl group (for example N,N-dimethylcarbamoyloxymethyl group, N-ethyl-N-methylcarbamoyloxy ethyl group or the like) is nominated. As alkylsulfonyl amino group, the one in which one alkylsulfonyl group containing the aforesaid C₁-C₆ alkyl group is substituted on amino group (for example methylsulphonylamino group, isopropyl sulfonyl amino group or the like) is nominated. As far as arylsulfonylamino group is concerned, the one in which one aryl sulphonyl group containing aforesaid aryl group is substituted on amino group (for example phenylsulfonyl amino group, naphthyl sulfonyl amino group or the like) is nominated. As alkylsulfonyl amino alkyl group, the one in which one of aforesaid C₁-C₆ alkylsulfonyl amino group is substituted on the aforesaid C₁-C₆ alkyl group (for example methylsulphonylamino methyl group, methylsulphonylamino ethyl group or the like) is nominated. As far as arylsulfonylamino alkyl group is concerned, the one in which one of aforesaid arylsulfonylamino group is substituted on aforesaid C₁-C₆ alkyl group (for example phenylsulfonyl aminomethyl group, naphthyl sulfonyl amino ethyl group or the like) is nominated. As alkylsulfonyl aminocarbonyl group, a group consisting from the aforesaid C₁-C₆ alkylsulfonyl amino group and carbonyl group (for example methylsulphonylamino carbonyl group, isopropyl sulfonyl aminocarbonyl group or the like) is nominated. As far as arylsulfonylamino carbonyl group is concerned, a group consisting from aforesaid arylsulfonylamino group and carbonyl group (for example phenylsulfonyl aminocarbonyl group, naphthyl sulfonyl aminocarbonyl group or the like) is nominated. As alkylsulfonyl aminocarbonyl alkyl group, the one in which the aforesaid C₁-C₆ alkylsulfonyl aminocarbonyl group is substituted on aforesaid C₁-C₆ alkyl group (for example methylsulphonylamino carbonyl methyl group, isopropyl sulfonyl aminocarbonyl methyl group or the like) is nominated. As far as arylsulfonylamino carbonyl alkyl group is concerned, the one in which aforesaid arylsulfonylamino carbonyl group is substituted on aforesaid C₁-C₆ alkyl group (for example phenylsulfonyl aminocarbonyl methyl group,

naphthyl sulfonyl aminocarbonyl methyl group or the like) is nominated. Acyl oxy group denotes a group consisting of aforesaid acyl group and oxygen atom (for example formyloxy group, acetyl oxy group or the like). As acyloxyalkyl group, the one in which aforesaid acyl oxy group is substituted on the aforesaid C₁-C₆ alkyl group (for example formyloxy methyl group, acetyl oxymethyl group or the like) is nominated. As aralkyloxy group, a group in which aforesaid aryl group is substituted on aforesaid C₁-C₆ alkoxy group (for example benzyloxy group, naphthyl methoxy group or the like) is nominated. As carboxyalkyl oxy group, the one in which carboxyl group is substituted on aforesaid alkoxy group (for example carboxymethoxy group, carboxy ethoxy group or the like) is nominated.

As far as aryl sulphonyl group is concerned, C₆-C₁₄ aryl sulphonyl group (for example phenylsulphonyl group, naphthyl sulphonyl group or the like) is nominated. As alkoxy carbonyl alkylsulphonyl group, a group consisting of aforesaid C₁-C₆ alkoxy carbonyl alkyl group and sulphonyl group (for example methoxycarbonyl ethyl sulphonyl group, ethoxycarbonyl ethylsulphonyl group or the like) is nominated. As carboxyalkyl sulphonyl group, a group consisting of aforesaid carboxyalkyl group and sulphonyl group (for example carboxymethyl sulphonyl group, carboxyethyl sulphonyl group or the like) is nominated. As alkoxy carbonyl acyl group, a group consisting of aforesaid alkoxy carbonyl alkyl group and carbonyl group (for example methoxycarbonylmethyl carbonyl group, ethoxycarbonylmethyl carbonyl group or the like) is nominated. As alkoxyalkyl oxycarbonyl group, the one in which one of aforesaid C₁-C₆ alkoxy group is substituted on aforesaid alkoxy carbonyl group (for example methoxymethyl oxycarbonyl group, methoxyethyl oxycarbonyl group or the like) is nominated. As hydroxy acyl group, the one in which one hydroxy group is substituted on aforesaid acyl group (including C₁-C₆ alkanoyl and aroyl) (for example glycoloyl group, lactoyl group, benzyloyl group or the like) is nominated. As alkoxy acyl group, the one in which one of aforesaid C₁-C₆ alkoxy group is substituted on aforesaid acyl group (for example methoxyacetyl group, ethoxy acetyl group or the like) is nominated. As halogeno acyl group, a group consisting of aforesaid halogeno alkyl group and carbonyl group (for example chloromethyl carbonyl group, trifluoromethyl carbonyl group or the like) is nominated. As carboxy acyl group, the one in which one carboxy-group is substituted on aforesaid acyl group (for example carboxy acetyl group, 2-carboxy propionyl group or the like) is nominated. As aminoacyl group, the one in which one amino group is substituted on aforesaid acyl group (including C₁-C₆ alkanoyl and aroyl) (for example aminomethyl carbonyl group, 1-amino ethyl carbonyl group or the like) is nominated. As acyloxyacyl group, a group consisting of aforesaid acyloxyalkyl group and

carbonyl group (for example formyloxy methyl carbonyl group, acetyl oxymethyl carbonyl group or the like) is nominated. As acyloxyalkyl sulphonyl group, a group consisting of aforesaid acyloxyalkyl group and sulphonyl group (for example formyloxy methylsulfonyl group, acetyl oxymethyl sulphonyl group or the like) is nominated. As hydroxyalkyl sulphonyl group, a group consisting of aforesaid C₁-C₆ hydroxyalkyl group and sulphonyl group (for example hydroxymethyl sulphonyl group, 1-hydroxyethyl sulphonyl group or the like) is nominated. As alkoxyalkyl sulphonyl group, a group consisting of aforesaid C₁-C₆ alkoxyalkyl group and sulphonyl group (for example methoxymethyl sulphonyl group, ethoxyethyl sulphonyl group or the like) is nominated. As 3-6 membered heterocyclic sulphonyl group which may have substituent, a group consisting of aforesaid 3-6 membered heterocycle which may contain substituent and the sulphonyl group (for example aziridinyl sulphonyl group, azetidiny sulphonyl group, pyrrolidinyl sulphonyl group, piperidinyl sulphonyl group, piperazinyl sulphonyl group, morpholinyl sulphonyl group, tetrahydropyranyl sulphonyl group or the like) is nominated. As N-alkylamino acyl group, the one in which one of aforesaid C₁-C₆ alkyl group is substituted on nitrogen atom of aforesaid aminoacyl group (for example N-methylamino acetyl group, N-ethylamino acetyl group or the like) is nominated. As N,N-dialkylamino acyl group, the one in which two of aforesaid C₁-C₆ alkyl group are substituted on nitrogen atom of aforesaid aminoacyl group (for example N,N-dimethylamino acetyl group, N-ethyl-N-methylamino acetyl group or the like) is proposed. As N,N-dialkyl carbamoyl acyl group which may contain substituent on alkyl group, it is nominated the one in which N,N-dialkyl carbamoyl group which may contain substituent on aforesaid C₁-C₆ alkyl group is substituted on aforesaid acyl group (for example N,N-dimethylcarbamoyl acetyl group, N,N-diethylcarbamoyl acetyl group, N-ethyl-N-methylcarbamoyl acetyl group or the like). As N,N-dialkyl carbamoyl alkylsulfonyl group which may contain substituent on alkyl group, a group consisting of N,N-dialkyl carbamoyl group which may contain substituent on aforesaid C₁-C₆ alkyl group and the sulphonyl group (for example N,N-dimethylcarbamoylmethyl sulphonyl group, N-[2-hydroxyethyl]-N-methylcarbamoyl methylsulfonyl group or the like) is proposed. As alkylsulfonyl acyl group, the one in which one alkylsulfonyl group containing aforesaid C₁-C₆ alkyl group is substituted on acyl group (for example methylsulfonyl acetyl group, isopropyl sulfonyl acetyl group or the like) is nominated.

Alkylene group denotes branched or straight chain alkylene group of carbon number 1-5, and for example, methylene group, ethylene group, propylene group or the like is nominated. Alkenylene group denotes 2-5 C alkenylene group containing one double bond, and for example, vinylene group,

propenylene group or the like is proposed. As alkylene dihydroxy group, for example, a group of carbon number 1-5 such as for example methylenedioxy group, ethylenedioxy group, propylene dihydroxy group and the like is nominated. Carbonyldioxy group is a group represented by $-\text{CO}-\text{C}(=\text{O})-\text{O}-$. Moreover, in aforesaid explanation, position of substitution is not restricted in particular.

Among these substituents represented by R^3 and R^4 , hydrogen atom, hydroxy group, alkyl group, alkenyl group, alkynyl group, halogen atom, halogeno alkyl group, amino group, hydroxyimino group, alkoxyimino group, amino alkyl group, N-alkylamino alkyl group, N,N-dialkylaminoalkyl group, acyl group, acyl alkyl group, acylimino-group which may have substituent, acylamino alkyl group, alkoxy group, alkoxyalkyl group, hydroxyalkyl group, carboxyl group, carboxyalkyl group, alkoxyacetyl group, alkoxyacetyl alkyl group, alkoxyacetyl amino group, alkoxyacetyl amino alkyl group, carbamoyl group, N-alkylcarbamoyl group which may contain substituent on alkyl group, N,N-dialkyl carbamoyl group which may contain substituent on alkyl group, N-alkenyl carbamoyl group, N-alkenyl carbamoyl alkyl group, N-alkenyl-N-alkylcarbamoyl group, N-alkenyl-N-alkylcarbamoyl alkyl group, N-alkoxy carbamoyl group, N-alkyl-N-alkoxy carbamoyl group, N-alkoxy carbamoyl alkyl group, N-alkyl-N-alkoxy carbamoyl alkyl group, carbazoyl group optionally-substituted by 1-3 alkyl group, alkylsulfonyl group, alkylsulfonyl alkyl group, 3-6 membered heterocyclic carbonyl group which may have substituent, 3-6 membered heterocyclic carbonyl oxy alkyl group which may have substituent, carbamoyl alkyl group, carbamoyloxy alkyl group, N-alkylcarbamoyloxy alkyl group, N,N-dialkyl carbamoyloxy alkyl group, N-alkylcarbamoyl alkyl group which may contain substituent on alkyl group, N,N-dialkyl carbamoyl alkyl group which may contain substituent on alkyl group, alkylsulfonyl amino group, alkylsulfonyl amino alkyl group, oxo group, acyl oxy group, acyloxyalkyl group, aryl sulphonyl group, alkoxyacetyl alkylsulfonyl group, carboxyalkyl sulphonyl group, alkoxyacetyl acyl group, carboxy acyl group, alkoxyalkyl oxycarbonyl group, halogeno acyl group, N,N-dialkylamino acyl group, acyloxyacyl group, hydroxy acyl group, alkoxy acyl group, alkoxyalkyl sulphonyl group, N,N-dialkyl carbamoyl acyl group, N,N-dialkyl carbamoyl alkylsulfonyl group, alkylsulfonyl acyl group and the like are preferred, and moreover alkylene group, alkenylene group, alkylene dihydroxy group, carbonyldioxy group and the like which R^3 and R^4 linked together are preferred.

As R^3 and R^4 , the case in which R^3 is hydrogen atom and R^4 is substituent which is nominated as aforesaid preferred group is preferred. More preferred group as R^4 in this case, hydrogen atom, hydroxy

group, alkyl group, halogen atom, hydroxyimino group, N-alkylamino alkyl group, N,N-dialkylaminoalkyl group, acyl group, acylimino group which may have substituent, acylamino alkyl group, alkoxy group, alkoxyalkyl group, hydroxyalkyl group, carboxyl group, alkoxycarbonyl group, alkoxycarbonyl alkyl group, alkoxycarbonylamino group, carbamoyl group, N-alkylcarbamoyl group which may contain substituent on alkyl group, N,N-dialkyl carbamoyl group which may contain substituent on alkyl group, N-alkenyl carbamoyl group, N-alkenyl carbamoyl alkyl group, N-alkenyl-N-alkylcarbamoyl group, N-alkenyl-N-alkylcarbamoyl alkyl group, N-alkoxy carbamoyl group, N-alkyl-N-alkoxy carbamoyl group, N-alkyl-N-alkoxy carbamoyl alkyl group, carbazoyl group optionally-substituted by 1-3 alkyl group, alkylsulfonyl group, alkylsulfonyl alkyl group, 3-6 membered heterocyclic carbonyl group which may have substituent, 3-6 membered heterocyclic carbonyl oxy alkyl group which may have substituent, carbamoyl alkyl group, N,N-dialkyl carbamoyloxy alkyl group, N-alkylcarbamoyl alkyl group which may contain substituent on alkyl group, N,N-dialkyl carbamoyl alkyl group which may contain substituent on alkyl group, alkylsulfonyl amino group, alkylsulfonyl amino alkyl group, acyl oxy group, aryl sulphonyl group, alkoxycarbonyl alkylsulfonyl group, carboxyalkyl sulphonyl group, alkoxycarbonyl acyl group, carboxy acyl group, alkoxyalkyl oxycarbonyl group, halogeno acyl group, N,N-dialkylamino acyl group, acyloxyacyl group, hydroxy acyl group, alkoxy acyl group, alkoxyalkyl sulphonyl group, N,N-dialkyl carbamoyl acyl group, N,N-dialkyl carbamoyl alkylsulfonyl group, alkylsulfonyl acyl group and the like are nominated.

Moreover, among these groups, as the group which is in particular preferred as R⁴, hydrogen atom, hydroxy group, alkyl group, N,N-dialkylaminoalkyl group, acylimino group which may have substituent, acylamino alkyl group, alkoxy group, alkoxyalkyl group, hydroxyalkyl group, alkoxycarbonyl group, alkoxycarbonylamino group, carbamoyl group, N-alkylcarbamoyl group which may contain substituent on alkyl group, N,N-dialkyl carbamoyl group which may contain substituent on alkyl group, N-alkenyl carbamoyl group, N-alkenyl carbamoyl alkyl group, N-alkenyl-N-alkylcarbamoyl group, N-alkenyl-N-alkylcarbamoyl alkyl group, N-alkyl-N-alkoxy carbamoyl group, carbazoyl group optionally-substituted by 1-3 alkyl group, alkylsulfonyl group, alkylsulfonyl alkyl group, 3-6 membered heterocyclic carbonyl group which may have substituent, N,N-dialkyl carbamoyloxy alkyl group, N-alkylcarbamoyl alkyl group which may contain substituent on alkyl group, N,N-dialkyl carbamoyl alkyl group which may contain substituent on alkyl group, alkylsulfonyl amino group, alkylsulfonyl amino alkyl group, acyl oxy group,

acyl group, alkoxyalkyl oxycarbonyl group, halogeno acyl group, N,N-dialkylamino acyl group, hydroxy acyl group, alkoxy acyl group are nominated.

As embodiment example of preferred substituent of R³ and R⁴, hydrogen atom, hydroxy group, methyl group, ethyl group, isopropyl group, N,N-dimethylaminomethyl group, N,N-dimethylaminoethyl group, N,N-diethylamino methyl group, acetylamino group, methoxyacetyl amino group, acetylamino methyl group, acetylamino ethyl group, methoxy group, ethoxy group, methoxymethyl group, methoxyethyl group, hydroxymethyl group, 2-hydroxyethyl group, 1-hydroxy-1-methylethyl group, methoxycarbonyl group, ethoxycarbonyl group, methoxycarbonylamino group, ethoxycarbonylamino group, N-allyl carbamoyl group, N-allyl carbamoylmethyl group, N-allyl-N-methylcarbamoyl group, N-allyl-N-methylcarbamoyl methyl group, N-methoxy-N-methylcarbamoyl group, N,N-dimethyl carbazoyl group, N,N,N'-trimethyl carbazoyl group, methanesulphonyl group, methanesulphonyl methyl group, ethane sulfonyl methyl group, N-methylcarbamoyl group, N-ethyl carbamoyl group, N-propyl carbamoyl group, N-isopropyl carbamoyl group, N-tert-butyl carbamoyl group, N-cyclopropyl carbamoyl group, N-cyclopropylmethyl carbamoyl group, N-(1-ethoxycarbonyl cyclopropyl) carbamoyl group, N-(2-hydroxyethyl) carbamoyl group, N-(2-fluoroethyl) carbamoyl group, N-(2-methoxyethyl) carbamoyl group, N-(carboxymethyl) carbamoyl group, N-(2-amino ethyl) carbamoyl group, N-(2-amidino ethyl) carbamoyl group, N,N-dimethylcarbamoyl group, N,N-diethylcarbamoyl group, N-ethyl-N-methylcarbamoyl group, N-isopropyl-N-methylcarbamoyl group, N-methyl-N-propyl carbamoyl group, N-(2-hydroxyethyl)-N-methylcarbamoyl group, N-(2-fluoroethyl)-N-methylcarbamoyl group, N,N-bis (2-hydroxyethyl) carbamoyl group, N,N-bis (2-fluoroethyl) carbamoyl group, N-(2-methoxyethyl)-N-methylcarbamoyl group, N-carboxymethyl-N-methylcarbamoyl group, N,N-bis (2-amino ethyl) carbamoyl group, azetidino carbonyl group, 3-methoxy azetidino carbonyl group, 3-hydroxy azetidino carbonyl group, pyrrolidino carbonyl group, 3-hydroxy pyrrolidino carbonyl group, 3-fluoro pyrrolidino carbonyl group, 3,4-dimethoxy pyrrolidino carbonyl group, piperidino carbonyl group, piperazino carbonyl group, morpholino carbonyl group (tetrahydropyran-4-yl) carbonyl group, benzoyl group, pyridyl carbonyl group, N-methylcarbamoyl methyl group, N-methylcarbamoyl ethyl group, N-ethyl carbamoylmethyl group, N-(2-fluoroethyl) carbamoylmethyl group, N-(2-methoxyethyl) carbamoylmethyl group, N,N-dimethylcarbamoylmethyl group, N,N-dimethylcarbamoyl ethyl group, N-(2-fluoroethyl)-N-methylcarbamoyl methyl group, N-(2-methoxyethyl)-N-methylcarbamoyl methyl group, N,N-dimethylcarbamoyloxymethyl group, 2-(N-ethyl-N-methylcarbamoyloxy) ethyl group,

methylsulphonylamino group, ethylsulfonyl amino group, methylsulphonylamino methyl group, methylsulphonylamino ethyl group, acetyl group, propionyl group, isobutyryl group, 2-methoxyethoxy carbonyl group, trifluoroacetyl group, N,N-dimethylamino acetyl group, N-ethyl-N-methylamino acetyl group, hydroxyacetyl group, 1,1-dimethyl-2-hydroxyethyl carbonyl group, methoxyacetyl group, 1,1-dimethyl-2-methoxyethyl carbonyl group are nominated.

As described in above, as R^3 and R^4 , the case in which R^3 is hydrogen atom and R^4 is aforesaid embodiment substituent is preferred. In particular N,N-dialkyl carbamoyl group which may contain substituent on alkyl group is preferred, and moreover N,N-dimethylcarbamoyl group is preferred. Wherein, R^3 and R^4 are not restricted in any way to these embodiment substituents.

About group T^0

Group T^0 denotes carbonyl group or thiocarbonyl group, but carbonyl group is more preferred.

About group T^1

Group T^1 denotes carbonyl group, sulphonyl group, group $-C(=O)-C(=O)-N(R')$ -, group $-C(=S)-C(=O)-N(R')$ -, group $-C(=O)-C(=S)-N(R')$ -, group $-C(=S)-C(=S)-N(R')$ - (in this group, R' denotes hydrogen atom, hydroxy group, alkyl group or alkoxy group), group $-C(=O)-A^1-N(R'')$ - (in this group, A^1 denotes 1-5 C alkylene group which may have substituent, and R'' denotes hydrogen atom, hydroxy group, alkyl group or alkoxy group), group $-C(=O)-NH-$, group $-C(=S)-NH-$, group $-C(=O)-NH-NH-$, group $-C(=O)-A^2-C(=O)-$ (in this group, A^2 denotes single bond or 1-5 C alkylene group), group $-C(=O)-A^3-C(=O)-NH-$ (in this group, A^3 denotes 1-5 C alkylene group), group $-C(=O)-C(NOR^a)-N(R^b)-$, group $-C(=S)-C(NOR^a)-N(R^b)-$ (in this group, R^a denotes hydrogen atom, alkyl group or alkanoyl group, and R^b denotes hydrogen atom, hydroxy group, alkyl group or alkoxy group), group $-C(=O)-N=N-$, group $-C(=S)-N=N-$ or thiocarbonyl group.

In above-mentioned group, 1-5 C alkylene group in A^1 , A^2 and A^3 denotes straight, branched or cyclic alkylene group of 1-5 C and for example, methylene group, ethylene group, propylene group, cyclopropylene group, 1,3-cyclopentylene group and the like are nominated. In R' , R'' , R^a and R^b , alkyl

group denotes straight, branched or cyclic alkyl group of 1-6 C , and for example, methyl group, ethyl group or the like is nominated. Alkoxy group denotes straight, branched or cyclic alkoxy group of carbon number 1-6, and for example, methoxy group, ethoxy group or the like is nominated.

In R^a, alkanoyl group denotes a group consisting of straight, branched or cyclic 1-6 C alkyl group and carbonyl group , and for example acetyl group, propionyl group or the like is nominated.

As group T¹, carbonyl group, group -C(=O)-C(=O)-N(R')-, group -C(=S)-C(=O)-N(R')-, group -C(=O)-C(=S)-N(R')-, group -C(=S)-C(=S)-N(R')- and group -C(=O)-CH₂-N(R'')- are preferred, and carbonyl group, group -C(=O)-C(=O)-N(R')-, group -C(=S)-C(=O)-N(R')-, group -C(=O)-C(=S)-N(R')- and group -C(=S)-C(=S)-N(R')- are particularly preferred.

About group R¹ and group R².

R¹ and R² are each independently denote hydrogen atom, hydroxy group, alkyl group or alkoxy group, and it is preferably hydrogen atom or alkyl group, and hydrogen atom is even more preferred.

In R¹ and R², alkyl group denotes straight, branched or cyclic alkyl group of 1-6 C , and for example, methyl group, ethyl group or the like is nominated. Alkoxy group denotes straight, branched or cyclic alkoxy group of carbon number 1-6, and for example, methoxy group, ethoxy group or the like is nominated. R¹ and R² are preferably each independently hydrogen atom or alkyl group, and the case which both are hydrogen atom is more preferred.

When T¹ is carbonyl group or sulphonyl group and Q⁵ in group Q³ is 1-8 C alkylene group or 2-8 C alkenylene group, Q⁴ is preferably, among aforesaid 12 kinds of groups , (b), (f), (g), (h), (i), (j), (k) and (l) (wherein, in group (f), as for N, 2 of carbon atom of ring in which R¹⁹ is substituted is substituted by nitrogen atom).

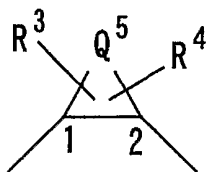
Moreover, N-alkylcarbamoyl group or N,N-dialkyl carbamoyl group is preferred as substituent on group Q⁵ when T¹ is carbonyl group or sulphonyl group and Q⁵ in group Q³ is 1-8 C alkylene group or 2-8 C alkenylene group.

When T^1 is group $-C(=O)-(=O)-N(R')$ -, group $-C(=S)-(=O)-N(R')$ -, group $-C(=O)-(=S)-N(R')$ - or group $-C(=S)-(=S)-N(R')$ - and Q^5 in group Q^3 is 1-8 C alkylene group or 2-8 C alkenylene group, Q^4 is preferably (i), (j) and (k) among aforesaid 12 kinds of groups.

Moreover, N-alkylcarbamoyl group or N,N-dialkyl carbamoyl group is preferred as substituent on group Q^5 when T^1 is group $-C(=O)-(=O)-N(R')$ -, group $-C(=S)-(=O)-N(R')$ -, group $-C(=O)-(=S)-N(R')$ - or group $-C(=S)-C(=S)-N(R')$ - and Q^5 in group Q^3 is 1-8 C alkylene group or 2-8 C alkenylene group.

The compound represented by general formula (1) of this invention, salts thereof, solvate thereof or N-oxide thereof has characteristic in combination of group T^1 and group Q^3 , and it comprises following two ((I) and (II)) in classifying roughly.

(I). The case in which T^1 denotes carbonyl group, sulphonyl group or thiocarbonyl group and Q^3 denotes following group

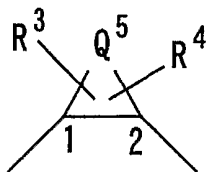


(in the group, Q^5 is group $-(CH_2)_m-CH_2-A-CH_2-(CH_2)_n-$ (in this group, m and n each independently denote an integer of 0, 1-3 and A denotes oxygen atom, nitrogen atom, sulfur atom, $-SO-$, $-SO_2-$, $-NH-$, $-O-NH-$, $-NH-NH-$, $-S-NH-$, $-SO-NH-$ or SO_2-NH-).

(II). The case in which T^1 denotes group $-C(=O)-C(=O)-N(R')$ -, group $-C(=S)-C(=O)-N(R')$ -, group $-C(=O)-C(=S)-N(R')$ -, group $-C(=S)-C(=S)-N(R')$ - (in this group, R' denotes hydrogen atom, hydroxy group, alkyl group or alkoxy group), group $-C(=O)-A^1-N(R'')$ - (in this group, A^1 denotes 1-5 C alkylene group which may have substituent, and R'' denotes hydrogen atom, hydroxy group, alkyl group or alkoxy group), group $-C(=O)-NH-$, group $-C(=S)-NH-$, group $-C(=O)-NH-NH-$, group $-C(=O)-A^2-C(=O)-$ (in this group, A^2 denotes single bond or 1-5 C alkylene group), group $-C(=O)-A^3-C(=O)-NH-$ (in this group, A^3 denotes 1-5 C alkylene group), group $-C(=O)-C(=NOR^a)-N(R^b)-$, group $-C(=S)-C(=NOR^a)-N(R^b)-$ (in this group, R^a denotes hydrogen atom, alkyl group or alkanoyl group, and R^b denotes hydrogen atom,

hydroxy group, alkyl group or alkoxy group), group $-C(=O)-N=N-$, group $-C(=S)-N=N-$ or thiocarbonyl group and

Q^3 denotes following group



(in this group, $-Q^5$ denotes 1-8 C alkylene group, 2-8 C alkenylene group or group $-(CH_2)_m-CH_2-A-CH_2-(CH_2)_n-$ (in this group, m and n each independently denote an integer of 0, 1-3, and A denotes oxygen atom, nitrogen atom, sulfur atom, $-SO-$, $-SO_2-$, $-NH-$, $-O-NH-$, $-NH-NH-$, $-S-NH-$, $-SO-NH-$ or SO_2-NH-)).

In the aforesaid (I) and (II), following (i) and (ii) can preferred nominated respectively .

(i) the one in which group R^1 and group R^2 are each independently hydrogen atom or alkyl group, group Q^1 is saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group which may have substituent or saturated or unsaturated bicyclic or tricyclic condensed polycyclic group which may have substituent, group Q^2 is a single bond and group Q^3 comprises wherein group Q^5 in group Q^3 is group $-(CH_2)_m-CH_2-A-CH_2-(CH_2)_n-$ (in this group, m and n each independently denote 0 or 1, and A is the same as above), and is the one which group Q^4 is selected from nine kinds of the group (a)-(h) and (l) among aforesaid 12 kind groups, group T^0 is carbonyl group or thiocarbonyl group and group T^1 is carbonyl group or sulphonyl group.

(ii) the one in which in general formula (1), group R^1 and R^2 are each independently hydrogen atom or alkyl group, group Q^1 is saturated or unsaturated bicyclic or tricyclic condensed hydrocarbon group which may have substituent or saturated or unsaturated bicyclic or tricyclic condensation heterocyclic group which may have substituent, group Q^2 is a single bond and group Q^3 comprises wherein group Q^5 in group Q^3 is 3-6 C alkylene group or group $-(CH_2)_m-CH_2-A-CH_2-(CH_2)_n-$ (in this group, m and n each independently denote 0 or 1 and A is the same as above), group Q^4 is selected from three kinds of the group (i), (j) and (k) among aforesaid 12 kind groups, group T^0 is carbonyl group or thiocarbonyl group

and group T¹ is group -C(=O)-(=O)-N(R')-, group -C(=S)-(=O)-N(R')-, group -C(=O)-(=S)-N(R')- or group -C(=S)-C(=S)-N(R')-.

Stereoisomer or optical isomer derived from asymmetric carbon atom may be present in compound represented by general formula (1) of this invention, and any of these stereoisomer, optical isomer and mixture thereof is including of this invention.

Salt of compound represented by general formula (1) of this invention is not restricted in particular as long as it is pharmacologically permitted salt. As embodiments, mineral acid salt such as for example hydrochloride, hydrobromic acid salt, hydroiodic acid salt, phosphate, nitrate and sulfate or the like, organic sulfonate species such as for example benzoate, methanesulfonate, 2-hydroxy ethane sulfonate, p-toluenesulfonate or the like and organic carboxylate species such as for example acetate propanoic acid salt, oxalate, malonate, succinate, glutarate, adipate, tartrate, maleate, malate, mandelic acid salt or the like are nominated. Moreover, when compound represented by general formula (1) contains acidic group, it may be salt of alkali metal ion or alkaline earth metal ion. As solventate, it is not restricted in particular as long as the one which can be pharmacologically permitted. As embodiments hydrate, ethanolate or the like are nominated. Moreover, when nitrogen atom is present in general formula (1), it may be N-oxide body.

As compounds of this invention, compound shown in later-described Examples and salt thereof or the like, the following compound and salts thereof or the like are particularly preferred.

- 1) 3-chloro-N-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) [1,6] naphthyridine-7-carboxamide,
- 2) 7-chloro-N-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl)-4-fluoro cinnoline-3-carboxamide,
- 3) 7-chloro-N-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl)-4a,8a-dihydro-4H-1,2,4-benzoxadiazine-3-carboxamide,
- 4) N-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl)-6-fluoro-4-oxo-1,4-dihydroquinoline-2-carboxamide,

- 5) 7-chloro-N-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl)-5-oxo-4,5-dihydro-1H-1,3,4-benzotriazepine-2-carboxamide,
- 6) 6-chloro-N-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl)-4-oxo-3,4-dihydro-2(1H)-cinnoline carboxamide,
- 7) 6-chloro-N-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl)-1,2,3,4-tetrahydroquinoline-2-carboxamide,
- 8) N-((1R, 2S, 5S)-2-[[3-(3-chlorophenyl)-2-propinoyl] amino]-5-[(dimethylamino) carbonyl] cyclohexyl)-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,
- 9) N-((1R, 2S, 5S)-2-[(4-chlorobenzoyl) amino]-5-[(dimethylamino) carbonyl] cyclohexyl)-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,
- 10) N-((1R, 2S, 5S)-2-[[5-chloroindol-2-yl) carbonyl] amino]-5-[(dimethylamino) carbonyl] cyclohexyl)-6-methyl-5,6,7,8-tetrahydro-4H-thiazolo [4,5-d] azepin-2-carboxamide,
- 11) 5-chloro-N-[(1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-((5-(3-pyrrolidinyl oxy) thiazol-2-yl) carbonyl) amino) cyclohexyl] indole-2-carboxamide,
- 12) N¹-(4-chlorophenyl)-N²-((1S, 2R)-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 13) N¹-(5-chloropyridine-2-yl)-N²-((1S, 2R)-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 14) N¹-(5-chloropyridine-2-yl)-N²-((1S, 2R)-2-[[5-methyl-5,6-dihydro-4H-pyrrolo [3,4-d] thiazol-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 15) N¹-(4-chlorophenyl)-N²-((1S, 2R)-2-[[5-methyl-5,6-dihydro-4H-pyrrolo [3,4-d] thiazol-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 16) N¹-(5-chloropyridine-2-yl)-N²-((1R, 2R)-2-[[5-methyl-5,6-dihydro-4H-pyrrolo [3,4-d] thiazol-2-yl) carbonyl] amino) cyclopentyl) ethane diamide,
- 17) N¹-(4-chlorophenyl)-N²-((1R, 2R)-2-[[5-methyl-5,6-dihydro-4H-pyrrolo [3,4-d] thiazol-2-yl) carbonyl] amino) cyclopentyl) ethane diamide,
- 18) N¹-(4-chlorophenyl)-N²-((1R, 2R)-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cycloheptyl) ethane diamide,
- 19) N¹-(5-chloropyridine-2-yl)-N²-((1R, 2R)-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cycloheptyl) ethane diamide,

- 20) N¹-(5-chloropyridine-2-yl)-N²-((1R, 2R)-2-{{(5-methyl-5,6-dihydro-4H-pyrrolo [3,4-d] thiazol-2-yl) carbonyl] amino) cycloheptyl) ethane diamide,
- 21) N¹-(4-chlorophenyl)-N²-((1R, 2R)-2-{{(5-methyl-5,6-dihydro-4H-pyrrolo [3,4-d] thiazol-2-yl) carbonyl] amino) cycloheptyl) ethane diamide,
- 22) N¹-(5-chloro-6-methylpyridine-2-yl)-N²-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-{{(5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 23) N¹-(5-chloro-3-methylpyridine-2-yl)-N²-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-{{(5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 24) N¹-(5-chloro-4-methylpyridine-2-yl)-N²-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-{{(5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 25) N¹-(4-chloro-3-hydroxyphenyl)-N²-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-{{(5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 26) N¹-(4-chloro-2-hydroxyphenyl)-N²-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-{{(5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 27) N¹-[4-chloro-2-(fluoromethyl) phenyl]-N²-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-{{(5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 28) N¹-[4-chloro-2-(methoxymethyl) phenyl]-N²-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-{{(5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 29) N-{{(1R, 2S, 5S)-2-({[1-(4-chloroanilino) cyclopropyl] carbonyl) amino)-5-{{(dimethylamino) carbonyl] cyclohexyl)-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,
- 30) N¹-(5-chloropyridine-2-yl)-N²-((1R, 2R, 4R)-4-(hydroxymethyl)-2-{{(5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclopentyl) ethane diamide,
- 31) N¹-(5-chloropyridine-2-yl)-N²-((1R, 2R, 4S)-4-(hydroxymethyl)-2-{{(5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclopentyl) ethane diamide,
- 32) N¹-((3R, 4S)-1-acetyl-3-{{(5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) piperidine-4-yl)-N²-(5-chloropyridine-2-yl) ethane diamide,
- 33) N¹-(5-chloropyridine-2-yl)-N²-((3R, 4S)-1-(methylsulfonyl)-3-{{(5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) piperidine-4-yl) ethane diamide,
- 34) N¹-{{(1S, 2R, 4S)-2-{{(3-chlorobenzo thiophen-2-yl) carbonyl] amino)-4-[(dimethylamino) carbonyl] cyclohexyl)-N²-(5-chloropyridine-2-yl) ethane diamide,

- 35) N¹-(5-chloropyridine-2-yl)-N²-((1S, 2R, 4S)-4-[(dimethylamino) carbo thioyl]-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,
- 36) N¹-(5-chloropyridine-2-yl)-N²-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbo thio yl] amino) cyclohexyl) ethane diamide,
- 37) N¹-(5-chloropyridine-2-yl)-N²-((3R, 4S)-1-(2-methoxy ethane thio yl)-3-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) piperidine-4-yl) ethane diamide,
- 38) N¹-(5-chloropyridine-2-yl)-N²-((3R, 4S)-1-(2-methoxyacetyl)-3-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbo thio yl] amino) piperidine-4-yl) ethane diamide,
- 39) N-[(3R, 4S)-4-({2-[[5-chloropyridine-2-yl] amino]-2-oxo ethane thio yl) amino)-1-(2-methoxyacetyl) piperidin-3-yl]-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,
- 40) N-[(3R, 4S)-4-({2-[[5-chloropyridine-2-yl] amino]-2-thioxo acetyl) amino)-1-(2-methoxyacetyl) piperidine-3-yl]-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,
- 41) N¹-(4-chlorophenyl)-N²-((3R, 4S)-1-(2-methoxy ethane thio yl)-3-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) piperidine-4-yl) ethane diamide,
- 42) N¹-(4-chlorophenyl)-N²-((3R, 4S)-1-(2-methoxyacetyl)-3-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbo thio yl] amino) piperidine-4-yl) ethane diamide,
- 43) N-[(3R, 4S)-4-{{2-(4-chloroanilino)-2-oxo ethane thio yl] amino)-1-(2-methoxyacetyl) piperidine-3-yl]-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,
- 44) N-[(3R, 4S)-4-{{2-[[4-chlorophenyl] amino]-2-thioxo acetyl) amino)-1-(2-methoxyacetyl) piperidin-3-yl]-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,
- 45) N¹-((1S, 2R, 4S)-4-(1-azetidiny carbonyl)-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl)-N²-(5-chloropyridine-2-yl) ethane diamide,
- 46) N¹-(5-chloropyridine-2-yl)-N²-[(1S, 2R, 4S)-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino)-4-(1-pyrrolidinylcarbonyl) cyclohexyl] ethane diamide,
- 47) N¹-(5-chloropyridine-2-yl)-N²-[(1S, 2R, 4S)-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino)-4-(1-piperidinyl carbonyl) cyclohexyl] ethane diamide,
- 48) N¹-(5-chloropyridine-2-yl)-N²-[(1S, 2R, 4S)-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino)-4-(4-morpholinyl carbonyl) cyclohexyl] ethane diamide,
- 49) N¹-(5-chloropyridine-2-yl)-N²-((1S, 2R, 4S)-4-[(methylamino) carbonyl]-2-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,

50) N-((1R, 2S, 5S)-2-((2-[[6-6-chloropyridazine-3-yl] amino]-2-oxo ethane thio yl) amino)-5-[(dimethylamino) carbonyl] cyclohexyl)-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,

51) N¹-(4-bromo phenyl)-N²-((3R, 4S)-1-(2-methoxyacetyl)-3-[[5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-C] pyridine-2-yl) carbonyl] amino) piperidine-4-yl) ethane diamide,

52) N¹-(5-chloropyridine-2 -yl)-N²-((3R, 4S)-1-(2-methoxyacetyl)-3-[[4-(pyridine-4-yl) benzoyl] amino) piperidine-4-yl) ethane diamide,

53) N¹-(5-chloropyridine-2-yl)-N²-[(3R, 4S)-1-(2-methoxyacetyl)-3-([2-[pyridine-4-yl] pyrimidine-5-yl] carbonyl) amino) piperidine-4-yl] ethane diamide,

54) N¹-(5-chloropyridine-2-yl)-N²-[(1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-([2-[pyridine-4-yl] pyrimidine-5-yl] carbonyl) amino) cyclohexyl] ethane diamide,

55) N-((1R, 2S, 5S)-2-([2-(4-chloroanilino)-2-oxo ethane (methoxy) imidoyl] amino) -5-[(dimethylamino) carbonyl] cyclohexyl)-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,

56) N-((1R, 2S, 5S)-2-([2-(4-chloroanilino)-2-(methoxyimino) acetyl] amino)-5-[(dimethylamino) carbonyl] cyclohexyl)-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,

57) N¹-(5-chloropyridine-2-yl)-N²-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-[[4,4,5-trimethyl-5,6-dihydro-4H-pyrrolo [3,4-d] thiazol-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,

58) N¹-(5-chloropyridine-2-yl)-N²-((1S, 2R, 4S)-4-[(dimethylamino) carbonyl]-2-[[4,4-ethylene-5-methyl-5,6-dihydro-4H-pyrrolo [3,4-d] thiazol-2-yl) carbonyl] amino) cyclohexyl) ethane diamide,

59) N-((1R, 2S, 5S)-2-([[(E)-2-(4-chlorophenyl) ethenyl] sulfonyl] amino)-5-[(dimethylamino) carbonyl] cyclohexyl)-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,

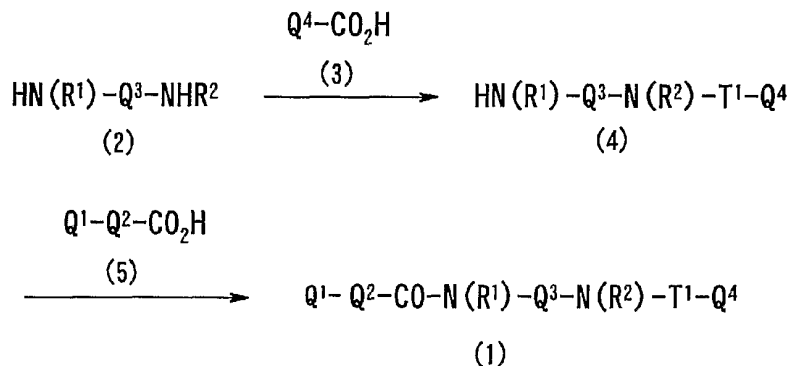
60) N-((1R, 2S, 5S)-2-([4-chlorobenzyl] sulfonyl] amino)-5-[(dimethylamino) carbonyl] cyclohexyl)-5-methyl-4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide,

61) N-((1R, 2S, 5S)-2-([2-([4-chlorophenyl] sulfonyl] amino) acetyl] amino)-5-[(dimethylamino) carbonyl] cyclohexyl)-5-methyl -4,5,6,7-tetrahydrothiazolo [5,4-c] pyridine-2-carboxamide.

Below a process for the production of diamine derivative (1) of this invention will be described.

Process for Production 1

Compound represented by general formula (1), salts thereof, solventate thereof or N-oxide thereof can be produced for example by the following method.



(wherein, Q¹, Q², Q³, Q⁴, R¹ and R² have the same aforesaid meanings, and T¹ denotes carbonyl group)

Carboxylic acid (3) is derived to mixed acid anhydride, acid halide or active ester and the like, and reacted with diamine (2), and thereby compound (4) is produced and compound of this invention (1) can be produced by reacting carboxylic acid (5) with the obtained compound (4) under similar conditions. Reaction reagent and condition to be conventionally used in peptide synthesis is applied in the each step of aforesaid reactions. Aforesaid mixed acid anhydride can be produced for example by reacting chloroformate ester species such as ethyl chloroformate, chloroformic acid isobutyl ester and the like with carboxylic acid (3) in the presence of base. Acid halide can be produced by treating carboxylic acid (3) with acid halide such as thionyl chloride, oxalyl chloride and the like. There are various kinds of activated esters, which can be produced for example by reacting phenols such as p-nitrophenol and the like, N-hydroxybenzotriazole or N-hydroxy succinimide or the like and carboxylic acid (3) using condensing agent such as N,N'-dicyclohexylcarbodiimide or 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide / hydrochloride or the like. Moreover, active esters can be produced by reactions of carboxylic acid (3) and pentafluorophenyl trifluoro acetate or the like, reaction of carboxylic acid (3) and 1-benzotriazolyl oxy tripyrrolidino phosphonium hexafluoro phosphite, reaction of carboxylic acid (3) and cyanophosphonic acid diethyl ester (Shioiri method), reaction of carboxylic acid (3) and triphenylphosphine and 2,2'-dipyridyl disulphide (Mukoyama method) or the like. It is possible to produce compound (4) by reacting mixed acid anhydride, active ester or acid halide of carboxylic acid (3) obtained in this way, with diamine (2) at 78°C- 150°C in inert solvent in the presence of suitable base. It

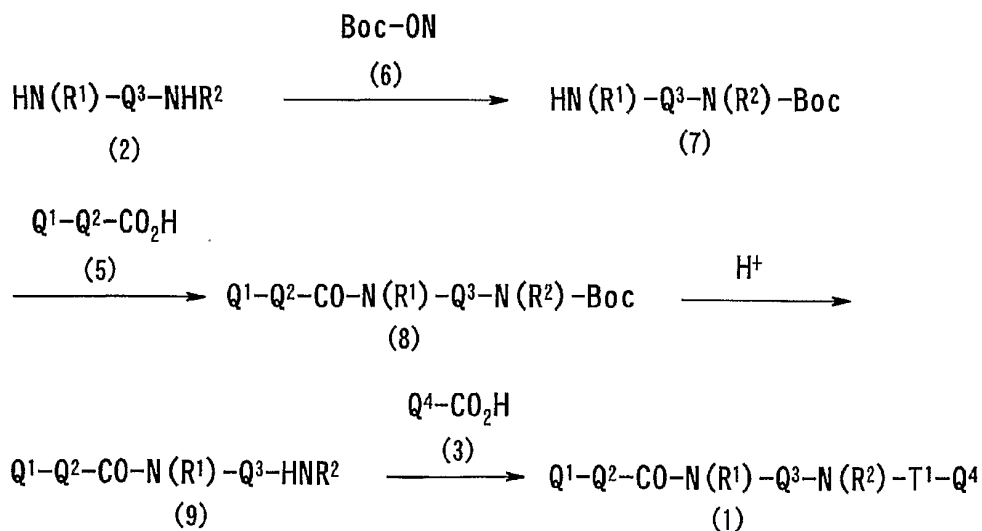
is possible to produce compound of this invention (1) by reacting mixed acid anhydride, active ester or acid halide of carboxylic acid (5), with the obtained compound (4) under similar conditions. Reagent and reaction conditions in the reaction of compound (4) and carboxylic acid (5) are similar to the reagent and reaction conditions in the reaction of diamine (2) and carboxylic acid (3).

As an example of base used for aforesaid each step, for example carbonate of alkali metal or alkaline earth metal, alkali metal alkoxide, alkali metal hydroxide or hydride such as sodium carbonate, potassium carbonate, sodium ethoxide, potassium butoxide, sodium hydroxide, potassium hydroxide, sodium hydride, potassium hydride, or alkyllithium such as n-butyllithium, organometallic base exemplified by dialkylamino lithium such as lithium diisopropylamide, organometallic base of bis silyl amine such as lithium bis (trimethylsilyl) amide, or organic base or the like such as pyridine, 2,6-lutidine, collidine, 4-dimethylaminopyridine, triethylamine, N-methylmorpholine, diisopropyl ethylamine, diazabicyclo[5.4.0] undec-7-en (DBU) are nominated.

As inert solvent used for this reaction, alkyl halide system solvent such as dichloromethane, chloroform, carbon tetrachloride or the like, ether type solvent such as tetrahydrofuran, 1,2-dimethoxyethane, dioxane or the like, aromatic system solvent such as benzene, toluene or the like, N,N-dimethylformamide, amide system solvent such as N,N-dimethylacetamide, N-methylpyrrolidin-2-one or the like are proposed and sulfoxide system solvent such as dimethylsulfoxide, sulfolane or the like ketone system solvent or the like such as acetone, methyl ethyl ketone or the like can be used depending on the case, in addition to these.

Process for Production 2

The compound of this invention (1) can be produced by the following method.



(wherein, Q¹, Q², Q³, Q⁴, R¹ and R² have the same aforesaid meanings, and T¹ denotes carbonyl group, and Boc denotes tert butoxycarbonyl group, and Boc-ON denotes 2-(tert butoxycarbonyl oximino)-2-phenylacetonitrile).

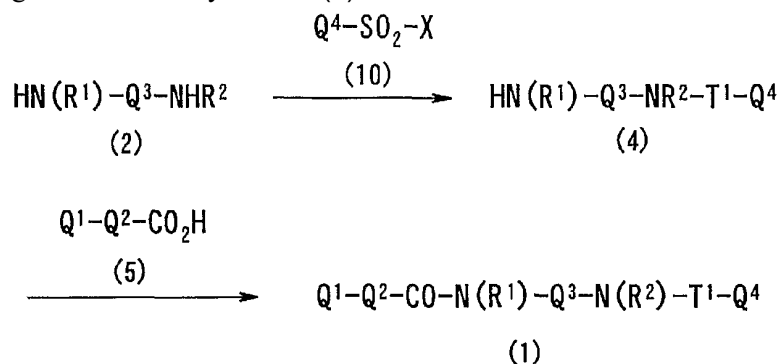
Diamine (2) is processed as above with Boc-ON (6), and compound (7) in which one of the two amino groups is protected with tert-butoxycarbonyl group is produced, carboxylic acid (5) is reacted with the obtained (7), and compound (8) is produced, and continuing this is treated acid, and compound (9) is formed, thereafter, it is possible to produce compound of this invention (1) by reacting it with carboxylic acid (3). Compound (7) can be produced by reacting at 10°C- 40°C in the presence triethylamine in solvent such as dichloromethane and the like. It is possible to produce compound (8) by reacting compound (7) and mixed acid anhydride, active ester or acid halide of carboxylic acid (5), under reaction conditions and reagents described in the process for the production 1. It is possible to produce amine (9) by treating the obtained compound (8) using the like of trifluoroacetic acid at -20°C - 70°C, and. The same reagents and condition described in the process for the production 1 may be used in the reaction of the obtained amine (9) and carboxylic acid (3).

By the way, tert butoxycarbonyl group of compound (7) can be replaced by the protecting group of other amino group. In that case, reagent (6) is replaced with other reagent, and the reaction conditions in accordance with it need to be used. As protecting group of other amino group, alkanoyl group such as acetyl group and the like, alkoxycarbonyl group such as , methoxycarbonyl group, ethoxycarbonyl group

and the like, aryl methoxycarbonyl group such as benzyloxycarbonyl group, para methoxybenzyl oxycarbonyl group, para (or ortho) nitrobenzyl oxycarbonyl group and the like, arylmethyl group such as , , benzyl group, triphenylmethyl group and the like, aroyl group such as benzoyl group and the like for example or aryl sulphonyl group such as 2,4-dinitrobenzene sulphonyl group, ortho nitrobenzene sulphonyl group and the like are nominated. These protecting groups can be selected or rejected according to the properties of the compound that protects amino group, and when these protecting groups are cleaved, reagents and the conditions which meet the protecting thereof can be selected.

Process for Production 3

Compound of this invention (1) can be produced by reacting diamine (2) with sulfonic halide (10), and thereafter, condensing it with carboxylic acid (5).

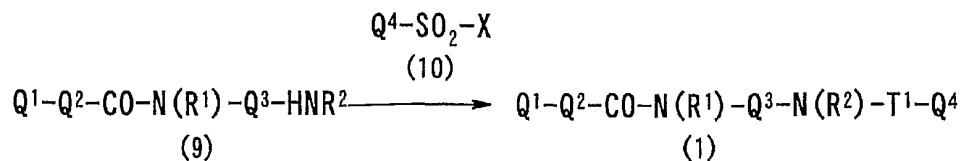


(wherein, Q¹, Q², Q³, Q⁴, R¹ and R² have the same aforesaid meanings, and T¹ denotes sulphonyl group, and X denotes a halogen atom).

It is possible to produce compound (4) by reacting diamine (2) and sulfonic halide (10) at -10°C - 30°C in the presence of base such as triethylamine and the like in inert solvent. The inert solvent and base are suitably selected from the species described in the process for the production 1 and are used. It is possible to produce compound of this invention (1) by condensing obtained (4) with carboxylic acid (5) using the reagents and the conditions described in the process for the production 1. Moreover sulfonic halide (10) can be synthesized by well known method (WO96/10022, WO00/09480) or process in accordance with this in the presence of suitable base.

Process for Production 4

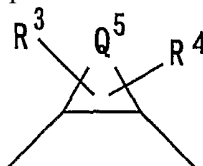
The compound of this invention (1) can be produced by the following method.



(wherein, Q¹, Q², Q³, Q⁴, R¹, R² and X have the same aforesaid meanings, and T¹ denotes sulphonyl group). In other words, it is possible to produce compound (1) by reacting amine (9) with sulfonic halide (10) in the presence of base in inert solvent at -10°C - 30°C. The inert solvent and base are suitably selected from those described in the process for the production 1 and are used.

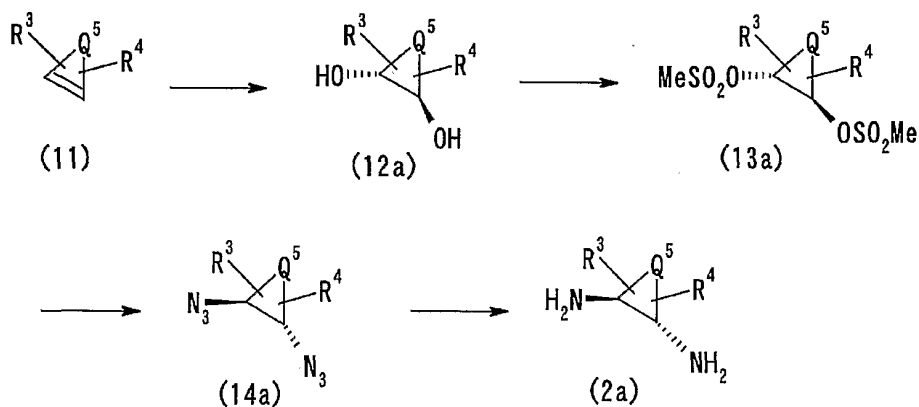
Process for Production 5

When Q³ part is the following group in compound of this invention (1),



(in this group, R³, R⁴ and Q⁵ have the same aforesaid meanings, and 1 and 2 denote positions), geometric isomers of trans form and cis form with regard to the relation of 1 and 2 positions, are present. Below a process for the production of compound (1) of such cis form and trans form will be described.

A process for the production of trans body.



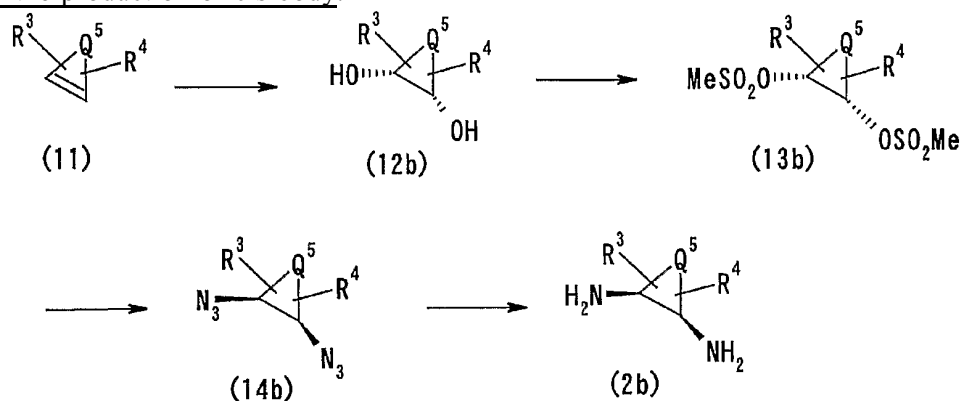
(wherein, Q⁵, R³ and R⁴ have the same aforesaid definition).

As Production Example of trans-diol (12a) from cyclic alkene (11), for example a conversion from cyclohexene to trans-cyclohexane diol (Organic Synthesis, 1955, vol III, pp 217) and the like are known

. Moreover, as Production Example of trans-diamine (2a) from trans-diol (12a), a conversion to trans-cyclopentane diamine from trans-cyclopentane diol (WO98/30574) and the like are reported. In accordance with these reports, it is possible to produce trans-diamine (2a) from cyclic alkene (11) .

The trans-diamine (2a) produced by aforesaid process can be derived to compound (1) of trans form by aforesaid processes for the production 1-4.

A process for the production of cis body.



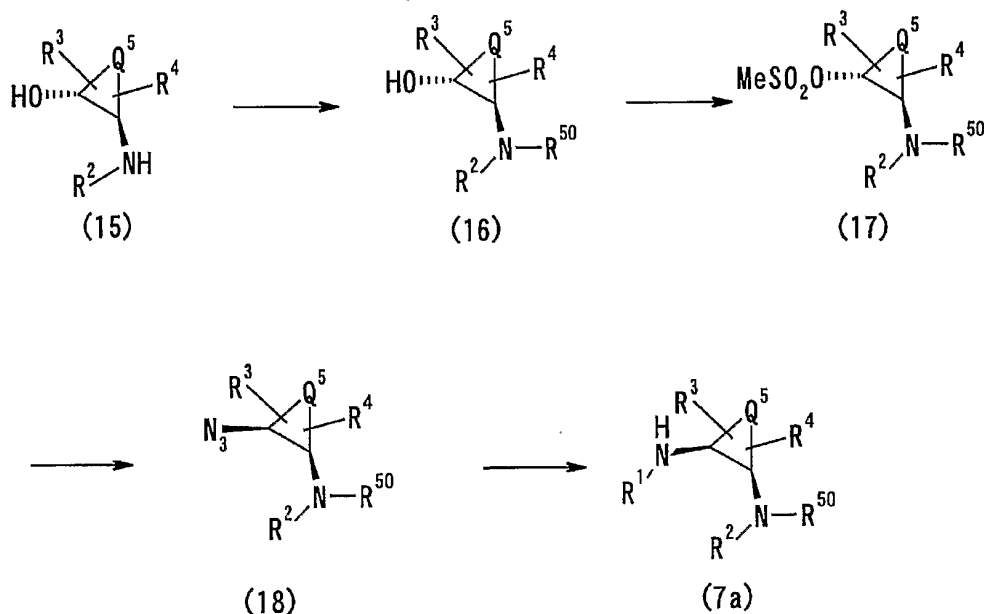
(wherein, Q⁵, R³ and R⁴ have the same aforesaid definition).

As Production Example of cis-diol (12b) from cyclic alkene (11), a conversion from cyclohexene to cis-cyclohexane diol (J. Org. Chem. 1998, vol 63, pp 6094) and the like are known . Moreover, as Production Example of cis-diamine (2b) from cis-diol (12b), a conversion to cis-cyclopentane diamine from cis-cyclopentane diol (WO98/30574) and the like are reported. In accordance with these reports, it is possible to produce cis-diamine (2b).

The cis-diamine (2b) produced by aforesaid process can be derived to compound (1) of cis form by aforesaid processes for the production 1-4.

Process for Production 6

In compound of this invention (1), there may be trans form and cis form of Q³ part as described above, and geometric isomers are present. However, optical isomer can be also present for each. Below a process for the production of optically active substance will be described.



(wherein, Q⁵, R¹, R², R³ and R⁴ have the same aforesaid meanings, and R⁵⁰ denotes protecting group of amino group).

As preparation method of amino alcohol derivative (15) of 1,2-trans form of optically active substance, for example, preparation method of 1,2-trans-2-amino cyclopentanol of optically active substance from cyclopentene oxide or preparation method of 1,2-trans-2-amino cyclohexanol of optically active substance from cyclohexane oxide is known (Tetrahedron: Asymmetry, 1996, vol 7, pp 843, J. Org. Chem. 1985, vol 50, pp 4154, J. Med. Chem. 1998, vol 41, pp 38). Amino group of amino alcohol derivative (15) of optically active substance produced by such already known method or applying a process thereof is reacted with suitable protection reagent, and it is possible to produce compound (16). As protecting group corresponding to R⁵⁰ in compound (16), alkoxycarbonyl group such as methoxycarbonyl group, ethoxycarbonyl group, tert butoxycarbonyl group and the like, aryl methoxycarbonyl group such as benzyloxycarbonyl group, para methoxybenzyl oxycarbonyl group, para (or ortho) nitrobenzyl oxycarbonyl group and the like, aryl sulphonyl group such as 2,4-dinitrobenzene sulphonyl group, ortho nitrobenzene sulphonyl group and the like are preferred even among of ordinary acyl type protecting group. For example, when it is protected with tert butoxycarbonyl group, it is possible to produce compound (16) by reacting amino alcohol derivative (15) with di-tert-butyl

dicarbonate at $-78^{\circ}\text{C} - 50^{\circ}\text{C}$ in inert solvent. The inert solvent is suitably selected from species described in the process for the production 1 and is used.

It is possible to produce compound (17) by reacting compound (16) with methanesulfonyl chloride at $-78^{\circ}\text{C} - 50^{\circ}\text{C}$ in the presence of base in inert solvent. The inert solvent is suitably selected from those described in the process for the production 1 and is used. As base, organic base or the like such as pyridine, 2,6-lutidine, collidine, 4-dimethylaminopyridine, triethylamine, N-methylmorpholine, diisopropyl ethylamine, diazabicyclo[5.4.0] undec-7-en (DBU) are preferred.

It is possible to produce compound (18) by reacting compound (17) with sodium azide at $-10^{\circ}\text{C} - 150^{\circ}\text{C}$ in suitable solvent. As solvent, amide system solvent such as N,N-dimethylformamide, N,N-dimethylacetamide, N-methylpyrrolidin-2-one and the like, alcohol system solvent such as methanol, ethanol or the like, ether type solvent such as tetrahydrofuran, 1,2-dimethoxyethane, dioxane and the like, benzene system solvent such as for example toluene and the like, halocarbon such as dichloromethane, chloroform, carbon tetrachloride and the like, acetone, dimethylsulfoxide or mixed solvent of these solvent and water, or the like are suitable.

As process to convert azide derivative (18) into compound (7a), there are plurality of processes such as process to hydrogenate using palladium system catalyst, Raney nickel catalyst or platinum catalyst, reaction or the like using reducing agent such as lithium aluminium hydride, sodium borohydride, hydrogenated boron zinc or the like, reaction using zinc in the presence of reaction nickel chloride or cobalt chloride, a reaction using triphenylphosphine or the like, and reaction conditions corresponding to property of compounds are selected. For example, it is possible to produce compound (7a) by hydrogenation of azide derivative (18) at temperature of $-10^{\circ}\text{C} - 70^{\circ}\text{C}$ in suitable solvent using palladium carbon of 1-20 % as catalyst. Hydrogen pressure can be increased to more than atmospheric pressure. As solvent, alcohol system solvent such as methanol, ethanol or the like, ether type solvent such as tetrahydrofuran, 1,2-dimethoxyethane, dioxane or the like, amide system solvent such as N,N-dimethylformamide, N,N-dimethylacetamide, N-methylpyrrolidin-2-one and the like, ester solvent such as ethyl acetate or the like, acetic acid, hydrochloric acid, water or a mixed solvent thereof are suitable.

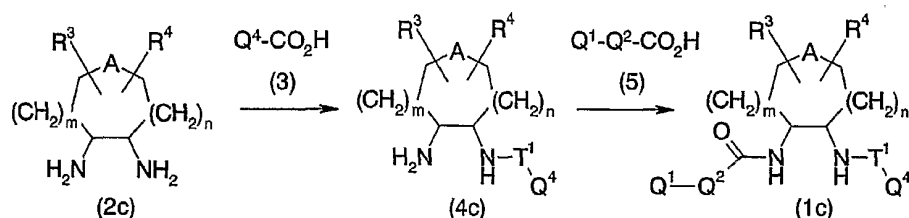
The amine (7a) of optical activity produced by aforesaid process can be derived to optically active compound (1) according to aforesaid process for the production 2. Moreover, the enantiomer (1) of optically active substance (1) obtained from optically active amine (7a) can be produced by the same process.

Moreover, as for compound (1) of optical activity, there is also a process for the production by separation of racemic body (1) using a column comprising optically active carrier. Moreover, intermediate (2), (4), (7), (8) or (9) that produce racemic body (1), are separated with column comprising optically active carrier, and optically active (2), (4), (7), (9) or (8) are isolated, and continuing optically active compound (1) can be produced according to the production processes 1-4. As process to isolate optically active (1), (2), (4), (7), (8) or (9), a process to resolve by crystallisation with salt of optically active carboxylic acid, or conversely, a process to resolve by crystallisation with salt of optically active base is possible, too.

Process for Production 7

Below, a process for the production of compound (1c) including heteroatom in Q³ of among compound of this invention (1) is explained in detail.

The compound represented by general formula (1c), salts thereof, solvate thereof or tN-oxide thereof, can be produced for example by the following method.



(wherein, Q¹, Q², Q⁴, R³, R⁴, A, m and n have the same aforesaid meanings, and T¹ denotes carbonyl group).

Carboxylic acid (3) is derived to mixed acid anhydride, acid halide or active ester or the like, and compound (4c) is produced by reaction with compound (2c), and it is possible to produce compound of

this invention (1c) by reacting carboxylic acid (5) with the obtained compound (4c) under similar condition.

Reaction reagents and conditions conventionally-used in peptide synthesis can be accordingly used in above-mentioned reaction of each step. Aforesaid mixed acid anhydride can be produced for example by reacting chloroformate ester species such as ethyl chloroformate, chloroformic acid isobutyl or the like with carboxylic acid (3) in the presence of base. Acid halide can be produced by treating carboxylic acid (3) with acid halide such as thionyl chloride, oxalyl chloride or the like. There are various kinds of activated esters, and for example, they can be produced by reacting phenols such as p-nitrophenol or the like, N-hydroxybenzotriazole or N-hydroxy succinic acid imide or the like with carboxylic acid (3) using condensing agent such as N,N-dicyclohexylcarbodiimide (DCC) or 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide / hydrochloride or the like. Moreover, active esters can be produced by reactions of carboxylic acid (3) and pentafluorophenyl trifluoro acetate or the like, reaction of carboxylic acid (3) and 1-benzotriazolyl oxy tripyrrolidino phosphonium hexafluoro phosphite, reaction of carboxylic acid (3) and cyanophosphonic acid diethyl ester (Shioiri method), reaction of carboxylic acid (3) and triphenylphosphine and 2,2'-dipyridyl disulphide (Mukoyama method) or the like. It is possible to produce compound (4c) by reacting mixed acid anhydride, active ester or acid halide of carboxylic acid (3) obtained in this way, with compound (2c) in the presence of suitable base, in an inert solvent under cooling to heating.

It is possible to produce compounds of this invention (1c) by reacting mixed acid anhydride, active ester or acid halide of carboxylic acid (5), under same condition with the obtained compound (4c). Reagents and reaction conditions in the reaction of compound (2c) and carboxylic acid (3) are similar to the reagents and reaction conditions in the reaction of compound (4c) and carboxylic acid (5).

As example of base used for above-mentioned each step, for example, carbonate of alkali metal or alkaline earth metal such as sodium carbonate, potassium carbonate or the like, alkali metal alkoxide such as sodium ethoxide, potassium butoxide or the like, alkali metal hydroxide such as sodium hydroxide, potassium hydroxide or the like, alkali metal hydride such as sodium hydride, potassium hydride or the like, the organometallic base exemplified by alkyllithium such as n-butyllithium or the like, dialkylamino lithium such as lithium diisopropylamide or the like organometallic base of bis silyl

amine such as lithium bis (trimethylsilyl) amide or the like or organic base such as pyridine, 2,6-lutidine, 4-dimethylaminopyridine, triethylamine, N-methylmorpholine, diisopropyl ethylamine, diazabicyclo[5.4.0] undec-7-ene (DBU) or the like are nominated.

As the inert solvent used in this reaction, alkyl halide system solvent such as dichloromethane, chloroform or the like, ether type solvent such as tetrahydrofuran, 1,4-dioxane or the like, aromatic system solvent such as benzene, toluene or the like, amide system solvent such as N,N-dimethylformamide or the like are proposed and, in addition to these, sulfoxide system solvent such as dimethylsulfoxide or the like, ketone system solvent or the like such as acetone or the like can be used with depending on the case.

Moreover, in aforesaid production step, it is possible to produce compound of this invention (1c) by addition of operations such as addition or elimination of appropriate protecting group and conversion of functional group.

As protecting group of amino group, protecting group of amino group usually used in synthesis of organic compound, in particular peptide synthesis can be used, and as embodiments, alkoxy carbonyl group such as tert butoxycarbonyl group, methoxycarbonyl group, ethoxycarbonyl group and the like, aryl methoxycarbonyl group such as benzyloxycarbonyl group, para methoxybenzyl oxycarbonyl group, para (or ortho) nitrobenzyl oxycarbonyl group and the like, arylmethyl group such as benzyl group, 4-methoxybenzyl group, triphenylmethyl group and the like, alkanoyl group such as formyl group, acetyl group and the like, aroyl group such as benzoyl group and the like, , or aryl sulphonyl group such as 2,4-dinitrobenzene sulphonyl group, ortho nitrobenzene sulphonyl group and the like are nominated.

As protecting group of hydroxy group, protecting groups of hydroxy group usually used for synthesis of organic compound can be used, in embodiment, alkoxy methyl group such as methoxymethyl group and the like, arylmethyl group such as benzyl group, 4-methoxybenzyl group, triphenylmethyl group and the like, alkanoyl group such as acetyl group and the like, aroyl group such as benzoyl group and the like, tert-butyl diphenyl silyloxy group and the like are nominated. The carboxy-group can be protected as esters with alkyl group such as methyl group, ethyl group, tert-butyl group and the like or arylmethyl

group such as benzyl group and the like. The addition and elimination of aforesaid protecting groups can be carried out in accordance with normal methods.

Compounds among compounds of this invention (1c) can be derived to various derivatives by converting functional group of compound thereof. For example, the compound in which A is an unsubstituted nitrogen atom, can produce amide compounds by acylating using mixed acid anhydride, acid halide or active ester or the like by ordinary organic chemical techniques, sulphonamide compounds by reacting with sulfonic halide or the like, N-aryl compounds by reacting aryl halide or the like, N-alkyl compounds by reacting alkyl halide, carbamate compounds by reacting with isocyanate or the like. Moreover, the compound in which A is an unsubstituted nitrogen atom can be produced for example by acid treating compound (1c) produced according to process for the production 7 from diamine (2c) in which A is protected with tert butoxycarbonyl group.

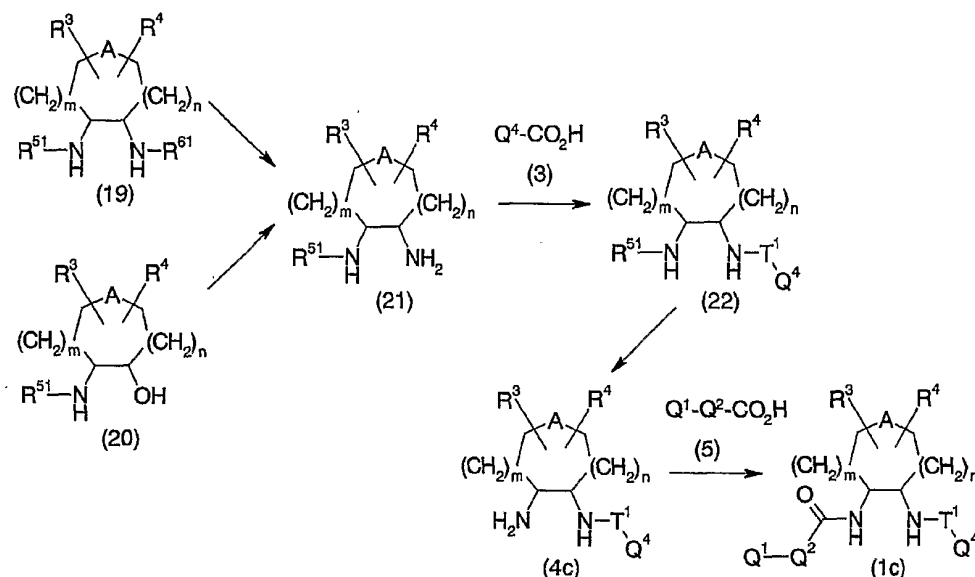
The compounds of this invention produced in this way can be isolated and purified by well known method, for example extraction, precipitation, fractionation chromatography, fractional crystallisation, recrystallization or the like. Moreover, the compounds of this invention can be derived into desired salts by subjection to ordinary salt producing reaction.

Moreover, optical isomers are present because the compounds of this invention contain asymmetric carbon. those optically active substances can be produced using the process in which racemic body is separated by the column chromatography or the like using optically active carrier, or a process in which salt is formed with optically active amine or acid, and resolved by fractional crystallisation, other than a process to produce from optically active diamine (2c).

Moreover, in reaction of compound (2c) and carboxylic acid (3), the compound (1c) in which T¹ is sulphonyl group can be produced by replacing carboxylic acid (3) with sulfonic halide (10).

Process for Production 8

The compound of this invention (1c) can be produced by the following method.



(wherein, Q^1 , Q^2 , Q^4 , R^3 , R^4 , A , m and n have the same aforesaid meanings, and T^1 denotes carbonyl group, and R^{51} and R^{61} denote protecting group of amino group)

It is possible to produce compound (21) by eliminating the protecting group R^{61} of compound (19) obtained by protecting amino group of compound (2c). Wherein, the protecting groups of the amino groups exemplified as R^{51} and R^{61} are not limited in particular, as long as they are groups usually used for the protection of amino group, and protecting groups of the amino group described in the process for the production 7 are nominated as representative thereof, but R^{51} and R^{61} need to be the protecting groups which can be eliminated under different processes or the conditions in this case. For example, a combination in which R^{51} is tert butoxy carbonyl group R^{61} is benzyloxycarbonyl group, or the like can be nominated as representative. These protecting groups can be selected and rejected according to the reagents and the conditions which meet the protecting group thereof and reagents and the conditions are selected corresponding to the protecting group thereof even in the elimination of protecting groups.

Moreover, it is possible that compound (21) is produced by converting hydroxy group of amino alcohol body (20) into amino group. As Production Example of amino alcohol body (20), for example a conversion to 3-hydroxy-4-amino thio pyran 1,1-dioxide from methionine (Tetrahedron Lett. Vol 37, pp 7457, 1996) and the like are known.

As process to convert hydroxy group of amino alcohol body (20) into amino group, a process for the production of diamine (21), wherein amino alcohol body (20) is reacted with methane sulphonyl chloride, p-toluenesulphonyl chloride, anhydrous trifluoromethanesulfonic acid or the like, and thereafter, it is reacted with primary arylalkylamine species such as ammonia, benzylamine, p-methoxybenzyl amine, primary 2,4-dimethoxybenzyl amine or the like, secondary arylalkylamine species such as dibenzylamine or the like, hydroxylamine species such as N-benzylhydroxylamine, N,O-dibenzyl hydroxylamine or the like, and benzyl group is eliminated in accordance with requirements, is nominated. Moreover, amino alcohol body (20) is reacted with phthalimide or succinimide by reaction of treatment with triphenyl phosphine and azo dicarboxylic acid ethyl ester (Mukoyama method) or the like, and thereafter, diamine (21) can be derived by the treatment with hydrazine or N-methylhydrazine or the like. And moreover when A is SO₂ and n=0 in the formula, amino alcohol body (20) is reacted with methane sulphonyl chloride, p-toluenesulphonyl chloride, anhydrous trifluoromethanesulfonic acid or the like, and thereafter, or primary arylalkylamine species such as ammonia, benzylamine, p-methoxybenzyl amine, primary 2,4-dimethoxybenzyl amine or the like, secondary arylalkylamine species such as dibenzylamine or the like, hydroxylamine species or the like such as N-benzylhydroxylamine, N, O-dibenzyl hydroxylamine or the like are added to alpha, beta-unsaturated cyclic sulfone formed by treating amino alcohol body (20) with triphenyl phosphine and azo dicarboxylic acid ethyl ester directly, or by treating with suitable base, and eliminating benzyl group in accordance with requirements and thereby diamine (21) can be produced.

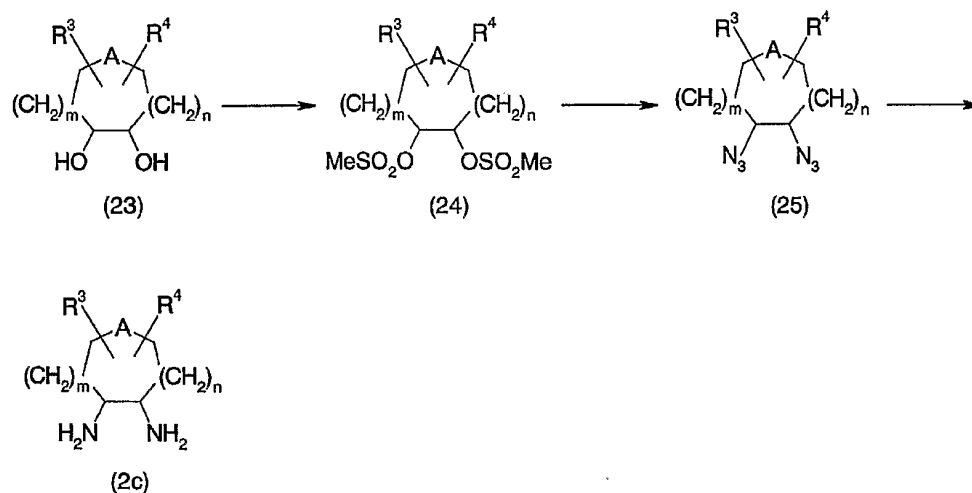
Compound (22) is produced by the reaction of carboxylic acid (3) to the obtained diamine compound (21), and continuously compound (4c) is obtained by eliminating protecting group R⁵¹, and thereafter by reacting with carboxylic acid (5), it is possible to produce compound of this invention (1c).

Agents and reaction conditions can be used the same as described in process for the production 7 in reaction of compound (21) and carboxylic acid (3) and reaction of compound (4c) and carboxylic acid (5).

In the same way, in reaction of compound (21) and carboxylic acid (3), it is possible to produce compound (1c) in which T¹ is sulphonyl group by replacing carboxylic acid (3) by sulfonic halide (10).

Process for Production 9

A typical process for the production of intermediate (2c) in accordance with process for the production 7 is described.



(wherein, R³, R⁴, A, m and n have the same aforesaid definitions).,

As production example of diol body (23), for example conversions from 1,2,3,6-tetrahydropyridine to 1-benzyloxycarbonyl-3,4-dihydroxypyrrolidine (Tokkai 7-138264), conversions from L-tartaric acid to (R, R)-tetrahydrofuran diol or (R, R)-N-benzyl pyrrolidine diol (Tetrahedron: Asymmetry, vol 8, pp 1861, 1997) and the like are known. It is possible to produce diol body (23) by carrying out elimination of protecting groups and conversion of functional group in accordance with requirements by such already known process or with applying such process.

It is possible to produce compound (24) by reacting diol body (23) with methane sulphonyl chloride under cooling -room temperature in the presence of base in inert solvent. The inert solvent is used by suitably-selecting from those described with process for the production 7 and, alkyl halide system solvent such as dichloromethane, chloroform or the like, ether type solvent such as tetrahydrofuran, 1,4-dioxane or the like are in particular preferred. As base, organic base such as pyridine, 2,6-lutidine, 4-dimethylaminopyridine, triethylamine, N-methylmorpholine, diisopropyl ethylamine, diazabicyclo[5.4.0] undec-7-en (DBU) or the like are preferred.

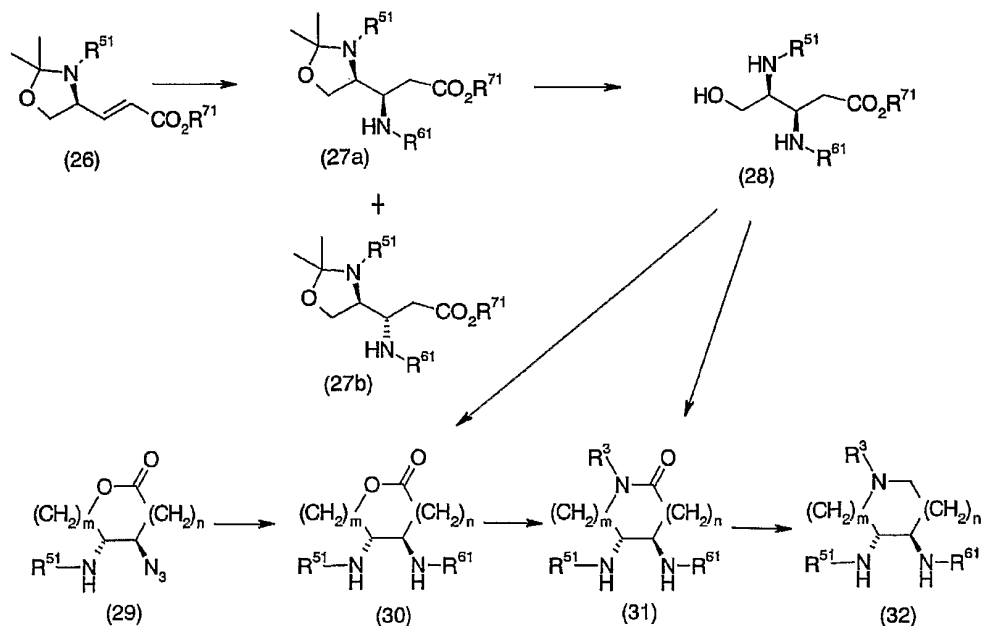
It is possible to produce azide body (25) by reacting compound (24) with sodium azide under cooling - heating in suitable solvent. As solvent, amide system solvent such as N,N-dimethylformamide, N-methylpyrrolidin-2-on or the like, alcohol system solvent such as methanol, ethanol or the like, ether type solvent such as tetrahydrofuran, 1,4-dioxane or the like, aromatic system solvent such as benzene, toluene or the like, alkyl halide system solvent such as dichloromethane, chloroform or the like, dimethylsulfoxide, acetone or the like are suitable. Moreover, aforesaid solvent in common use may be mixture of water.

As a process to convert azide body (25) into compound (2c), there are many processes such as a process to hydrogenate using palladium system catalyst, Raney nickel catalyst or platinum catalyst, a process of using reducing agent such as lithium aluminium hydride, sodium borohydride or the like, a process of using zinc in the presence of nickel chloride or cobalt chloride, a process of using triphenyl phosphine, or the like, and agents and conditions may be selected according to characteristics of compound. Hydrogen pressure can be raised to atmospheric pressure or more. As solvent, alcohol system solvent such as methanol, ethanol or the like, ether type solvent such as tetrahydrofuran, 1,4-dioxane or the like, amide system solvent such as N,N-dimethylformamide, N-methylpyrrolidin-2-on or the like, ester system solvent such as ethyl acetate or the like, acetic acid, hydrochloric acid, water or mixed solvent thereof is suitable. Diamine body (2c) produced by aforesaid process can be derived to compound of this invention (1c) according to aforesaid process for the production 7.

When diol body (23) is trans-3,4-dihydroxy tetrahydrofuran, trans-1-substituted-3,4-dihydroxypyrrolidine or the like, optically active substance is present. These optically active diol body (23) can be derived to optically active diamine body (2c), and moreover, it can be derived to optically active compound of this invention (1c) according to process for the production 7.

Process for Production 10

A representative process for the production of optically active compound (30) (31) and (32) which include in compound (19) in accordance with a process for the production 8 is described. Moreover the coordination of asymmetric carbon shown in the following production pathway is shown as one example.



(wherein, m , n , R^3 , R^{51} and R^{61} have the same aforesaid meanings, and R^{71} denotes protecting group of carboxy group).

Optically active alpha, beta-unsaturated ester body (26) can be produced by process described in literature (J. Org. Chem. Vol 61, pp 581, 1996; J. Org. Chem. Vol 57, pp 6279, 1992 and the like) or by applying process thereof. It is possible to produce diastereomer (27a) and (27b) by causing to act optically active alpha, beta-unsaturated ester body (26) and amine under cooling -heating in suitable solvent. Amine can be used by suitably-selecting from one described in aforesaid process for the production 8. As solvent, the organic solvent which is not reacted with substrate, product or reagent or the like, in particularly alcohol system solvent such as methanol, ethanol or the like, ether type solvent such as tetrahydrofuran, 1,2-dimethoxyethane, 1,4-dioxane or the like are desirable. Moreover, it is possible to produce diastereomer (27a) and (27b) by reacting alpha, beta-unsaturated ester body (26) and organometallic base such as lithium N-benzyl (trimethylsilyl) amide or the like with applying a process described in literature (J. Org. Chem. Vol 63, pp 7263, 1998). For example, by separating this diastereomer, it is possible to use (27a) for the next reaction.

Compound (28) is produced by acid treatment of compound (27a) under cooling -heating in suitable solvent. As the acid which is used, hydrochloric acid, sulphuric acid, Lewis acid such as boron trifluoride

or the like, trifluoroacetic acid, p-toluenesulfonic acid or the like are proposed, and as solvent used for reaction, water, alcohol system solvent or the like such as methanol, ethanol or the like are used. Aforesaid solvent may be mixture of water. Moreover, there is the case that protecting group R⁶¹ of amino group is cut in this reaction. In that case, it needs to be reacted with suitable protection reagent of amino group in accordance with requirements.

It is possible to produce optically active compound (30) by acid treating compound (28) under cooling-heating in solvent. As the acid which is used, it is suitably-selected from among aforesaid acid and is used, and in particularly Lewis acid such as boron trifluoride or the like, p-toluenesulfonic acid or the like are preferred. As solvent used for reaction, ether type solvent such as 1,4-dioxane, tetrahydrofuran or the like, aromatic system solvent such as benzene, toluene or the like are used. Moreover, compound (30) can be produced from azide body (29). As Production Example of optically active azide body (29), for example conversions from L-aspartic acid to (R, R)-(3S, 4S)-3-amino-4-azide-5-oxo tetrahydrofuran (Can. J. Chem., vol 71, pp 1407, 1993) and the like are known. It is possible to produce azide body (29) by carrying out elimination of protecting groups and conversion of functional group in accordance with requirements by such already known process or with applying such process. It is possible to produce compound (30) by reacting with suitable protection reagent of amino group after forming amino group by reducing azide of azide body (29). In reduction of azide, it can be used the same reagent and reaction conditions described in a process to convert azide body (25) into compound (2c) of process for the production 9.

Compound (31) can be produced by treating with base after converting hydroxy group part of compound (28) into amino group. As process to convert hydroxy group of compound (28) into amino group, it can be performed for example according to the aforesaid process for the production 8. Or alcohol body (28) is processed with oxidant, and thereafter, obtained aldehyde body is aminated reductively and compound (31) can be produced. As oxidant to be used by the aforesaid reaction, as embodiments pyridinium chlorochromate (PCC), pyridinium dichromate (PDC), sulfur trioxide pyridine complex salt or the like are preferred. As amine, primary alkyl amines such as ammonia, methylamine, ethylamine or the like, primary arylalkylamine species or the like such as benzylamine, p-methoxybenzyl amine, 2,4-dimethoxybenzyl amine or the like are nominated. As reduction process, there are a process to be hydrogenated using palladium system catalyst, Raney nickel catalyst or platinum catalyst, a reaction

using reducing agent such as sodium borohydride, triacetoxy sodium borohydride, sodium cyanoborohydride or the like, and reagent and condition are chosen corresponding to property or the like of compound. Moreover, base which is used in aforesaid step is suitably-selected from among base described in a process for the production 7 and used. Moreover, compound (31) can be produced by a process described in literature (Tetrahedron Lett., vol 41, pp 1141, 2000; Heterocycles, vol 53, pp 173, 2000) or by applying process thereof using aforesaid compound (30) and amine. As the amine which is used, primary alkyl amines such as ammonia, methylamine, ethylamine or the like, primary arylalkylamine species such as benzylamine, p-methoxybenzyl amine or the like, aniline or the like are nominated.

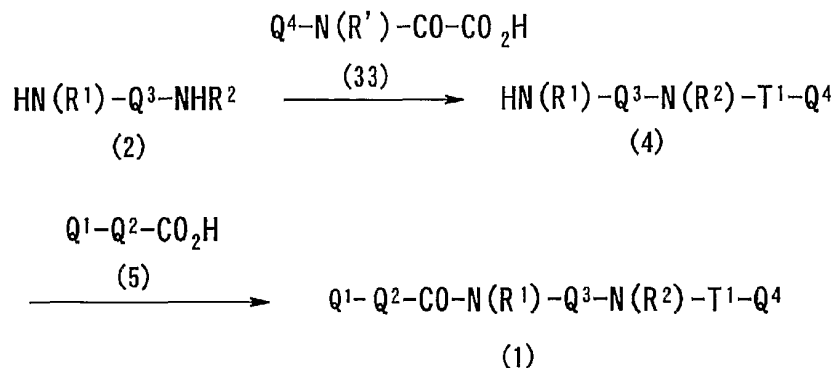
It is possible to produce compound (32) by treating the aforesaid compound (31) using reducing agent under cooling-heating in solvent. As reducing agent, reducing agent such as borane / tetrahydrofuran complex, borane / methyl sulphide complex, lithium aluminium hydride or the like are proposed, but reagent and condition are chosen corresponding to property or the like of compound. As solvent, the organic solvent which is not reacted with substrate, product or reagent or the like, in particularly ether type solvent such as tetrahydrofuran, 1,4-dioxane or the like is desirable.

Compound (30), (31) and (32) produced by aforesaid process can be derived to optically active substance (1c) of the compound of this invention according to aforesaid process for the production 8.

Aforesaid production step is exemplified in one of optically active substances, and optically active substance of differing stereo coordination can be produced with similar step if starting material of differing stereo coordination is used.

Process for Production 11

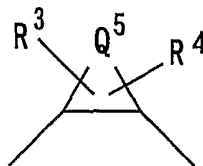
It is possible that compound (1) in which T¹ is -CO-CO-N(R')- group (in this group, R' has the same aforesaid definition) is produced with the following pathway.



(wherein, Q¹, Q², Q³, Q⁴, R¹, R² and R' have the same aforesaid meanings and T¹ denotes -CO-CO-N(R')- group (in this group, R' has the same aforesaid definition)).

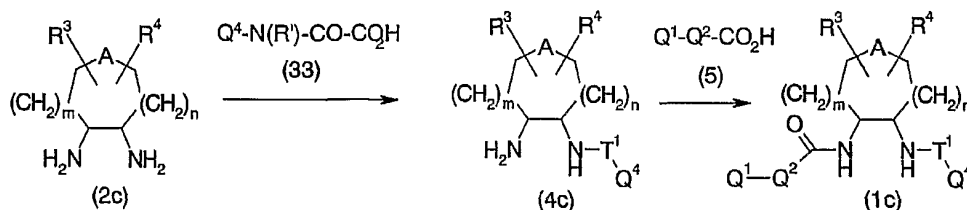
In other words, carboxylic acid (33) is derived in acid halide or active ester and the like and reacted with diamine (2), and compound (4) is produced, and it is possible to produce compound of this invention (1) by reacting carboxylic acid (5) to the obtained compound (4) under similar condition. In reaction of aforesaid each step, reaction reagent and condition conventionally-used in peptide synthesis can be used. Aforesaid acid halide can be produced by treating carboxylic acid (33) with acid halide such as for example thionyl chloride, oxalyl chloride and the like. There are several species as activated ester, however, it can be produced by reacting for example phenols such as p-nitrophenol and the like, N-hydroxybenzotriazole or N-hydroxy succinimide or the like with carboxylic acid (33) using condensing agent such as N,N'-dicyclohexylcarbodiimide or 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide / hydrochloride or the like. Moreover, active ester can be produced by reaction of carboxylic acid (33) and pentafluorophenyl trifluoroacetate or the like, reaction of carboxylic acid (33) and 1-benzotriazolyl oxy tripyrrolidino phosphonium hexafluoro phosphite, reaction of carboxylic acid (33) and cyanophosphonic acid diethyl ester (Shioiri method), reaction of carboxylic acid (33) and triphenyl phosphine and 2,2'-dipyridyl disulphide (Mukoyama method) or the like. It is possible to produce compound (4) by reacting mixed acid anhydride of carboxylic acid (33) obtained like this, active ester or acid halide at 78°C-150°C in inert solvent in the presence of diamine (2) and suitable base. It is possible to produce compound of this invention (1) by reacting mixed acid anhydride of carboxylic acid (5), active ester or acid halide to the obtained compound (4) under similar condition. Reagent and reaction conditions in reaction of compound (4) and carboxylic acid (5) are similar to reagent and reaction conditions in reaction of diamine (2) and carboxylic acid (33). Base and solvent used for aforesaid each step is suitably-selected from among described in process for the production 1.

Moreover, when Q^3 is following group



(in this group, R^3 , R^4 and Q^5 have the same aforesaid meanings, and numbers of 1 and 2 denote positions) and relation of 1 and 2-position produces compound (1) of cis form or trans form, diamine (2a) or (2b) described in process for the production 5 may be used.

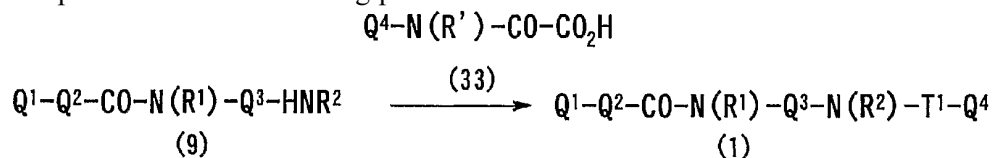
Moreover, when compound (1) including heteroatom such as for example nitrogen atom, oxygen atom, sulfur atom or the like in Q^5 can be produced by replacing carboxylic acid (3) by carboxylic acid (33) in reaction of compound (2c) and carboxylic acid (3) described in process for the production 7. In other words, compound (1) including heteroatom in Q^5 , namely compound (1c) is possible to produce with the following pathway.



(wherein, Q^1 , Q^2 , Q^4 , R^3 , R^4 , R' , A , m and n have the same aforesaid meanings and T^1 denotes $-CO-CO-N(R')$ - group (in this group, R' has the same aforesaid definition)).

Process for Production 12

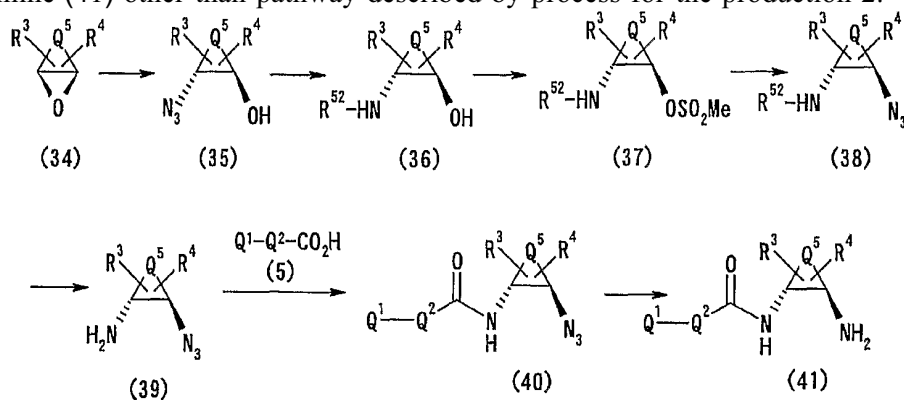
Compound (1) in which T^1 is $-CO-CO-N(R')$ - group (in this group, R' has the same aforesaid definition) is possible to be produced in the following path.



(wherein, Q^1 , Q^2 , Q^4 , R^3 , R^4 , R^1 and R' have the same aforesaid meanings and T^1 denotes $-CO-CO-N(R')$ - group (in this group, R' has the same aforesaid definition)).

The same reagent and conditions described in process for the production 1 can be used in reaction of amine (9) and carboxylic acid (33).

Wherein, amine (9) used can be produced even for example the pathway denoted as production pathway of following amine (41) other than pathway described by process for the production 2.



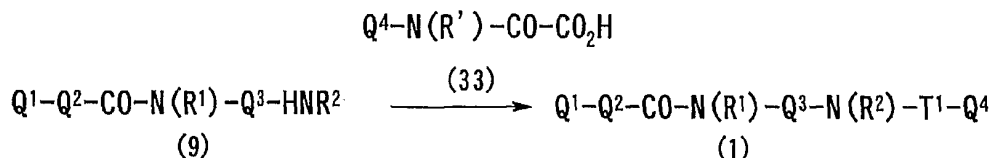
(wherein, R^3 , R^4 , Q^1 , Q^2 and Q^5 have the same aforesaid meanings, and R^{52} denotes protecting group of amino group).

Compound (34) in aforesaid production step can be produced by epoxifying cycloalkene by treating with perbenzoic acid or derivatives thereof or the like in solvent such as for example dichloro methane and the like. The ordinary condition for epoxifying alkene can be used as these reaction conditions. Moreover, compound (34) can be produced by process in accordance with J. Org. Chem. vol. 61, 8687-8691[1996] or method in accordance with it.

Compound (34) can be derived to compound (36) by catalytic reduction of azide (35) obtained by treatment with sodium azide and the like in accordance with normal methods, and thereafter protecting amino group. As protecting group of amino group of this case, the one described in process for the production 2 is nominated. Compound (36) can be derived to compound (39) by eliminating protecting group of amino group after it is formed to azide (38) in the same way as in the process described in process for the production 5. By reacting Compound (39) can be formed compound (41) by catalytic reduction after forming compound (40) by reacting with carboxylic acid (5).

Process for Production 13

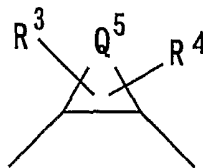
Compound (1) in which T¹ is -CO-CO-N(R')- group (in this group, R' has the same aforesaid definition) can be produced by replacing reaction of compound (9) and carboxylic acid (3) in pathway in accordance with process for the production 2 by the reaction of compound (9) and carboxylic acid (33).



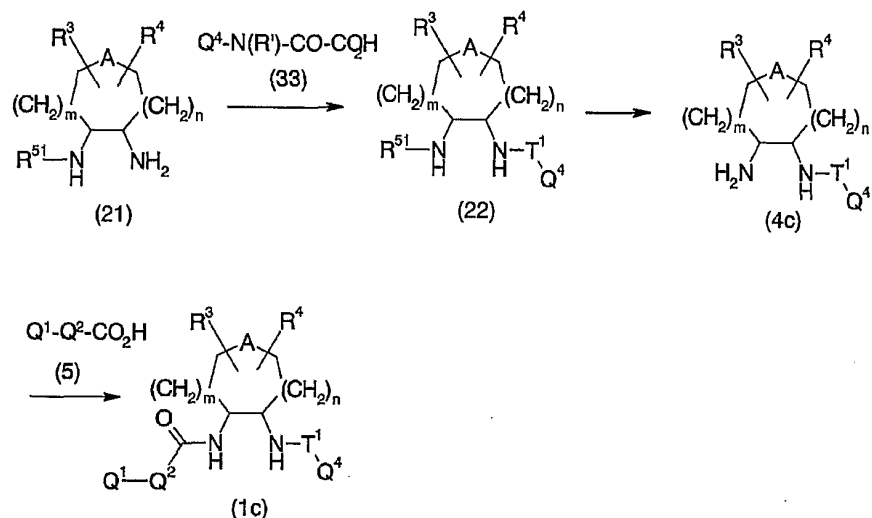
(wherein, Q¹, Q², Q³, Q⁴, R¹, R² and R' have the same aforesaid meanings and T¹ denotes -CO-CO-N(R')- group (in this group, R' has the same aforesaid definition)).

Reaction conditions can be applied the one mentioned in process for the production 2.

Moreover, when Q³ is following group



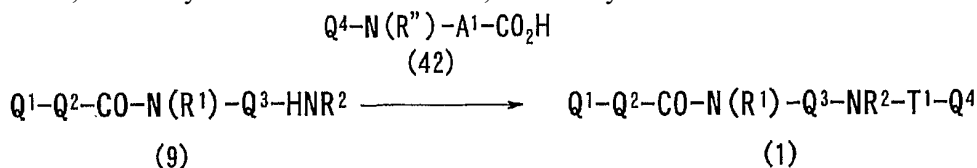
(in this group, R³, R⁴ and Q⁵ have the same aforesaid meanings, and numbers of 1 and 2 denote positions), compound (1) including heteroatom such as for example nitrogen atom, oxygen atom, sulfur atom or the like in Q⁵ can be produced by replacing carboxylic acid (3) by carboxylic acid (33) in reaction of compound (21) and carboxylic acid (3) in accordance with process for the production 8. compound (1) including heteroatom in Q⁵, in other words, compound (1c) is possible to produce with the following pathway.



(wherein, Q^1 , Q^2 , Q^4 , R^3 , R^4 , R^1 , A , m and n have the same aforesaid meanings, T^1 denotes $-CO-CO-N(R^1)-$ group (in this group, R^1 has the same aforesaid definition) and R^{51} denotes protecting group of amino group).

Process for Production 14

It is possible to produce compound (1) in which T^1 is $-CO-A^1-N(R'')$ group (wherein, R'' denotes a hydrogen atom, hydroxy group, alkyl group or alkoxy group, and A^1 denotes 1-5 C alkylene group optionally having substituent) by reacting compound (9) in accordance with process for the production 2 and $Q^4-N(R'')-A^1-CO_2H$ (42) at 50-50°C using condensing agent in inert solvent. As condensing agent, for example N,N' -dicyclohexylcarbodiimide or 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide / hydrochloride or the like is nominated. As inert solvent, alkyl halide series solvent such as dichloromethane, chloroform, carbon tetrachloride or the like, ether type solvent such as tetrahydrofuran, 1,2-dimethoxyethane, dioxane or the like, aromatic system solvent such as benzene, toluene or the like, amide system solvent such as N,N -dimethylformamide or the like are nominated.



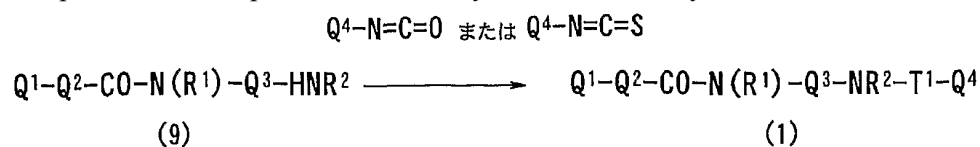
(wherein, Q¹, Q², Q³, Q⁴, R¹, R² and R" have the same aforesaid meanings, and T¹ denotes -CO- A¹-N(R")- group (wherein, R" denotes a hydrogen atom, hydroxy group, alkyl group or alkoxy group, and A¹ denotes 1-5 C alkylene group optionally having substituent).

Compound 42 described in aforesaid process for the production is reacted ester of bromo alkanic acid and arylamine such as for example 4-chloroaniline and the like at 40-120°C in the presence of base such as for example potassium carbonate and the like in solvent such as for example acetonitrile, N,N-dimethylformamide and the like, thereafter, it is possible to be produced by hydrolysing ester using alkali such as for example lithium hydroxide, potassium hydroxide, sodium hydroxide and the like.

For compound 42, potassium salt or the like may be used without further treatment in reaction.

Process for Production 15

The compound (1) in which T¹ is -C(=O)-NH- group or -C(=S)-NH- group can be produced by reacting compound (9) in accordance with process for the production 2 and isocyanate (Q⁴-N=C=O) or isothiocyanate (Q⁴-N=C=S) at 20-50°C in inert solvent. As inert solvent, the one described in process for the production 14 can be nominated for a representative example. Wherein, isocyanate or isothiocyanate to be used, when commercial one cannot be used, it can be produced using a process to be used widely as a process for the production of isocyanate or isothiocyanate.

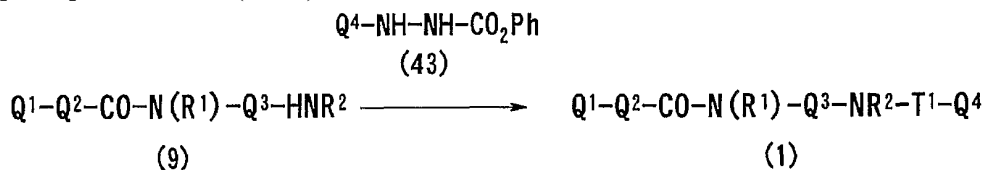


(wherein, Q¹, Q², Q³, Q⁴, R¹ and R² have the same aforesaid meanings, and T¹ denotes -C(=O)-NH- group or -C(=S)-NH- group).

Process for Production 16

It is possible to produce compound (1) in which T¹ is -CO-NH-NH- group by reacting compound (9) in accordance with process for the production 2 and Q⁴-NH-NH-CO₂Ph (43) at room temperature-150°C in inert solvent and in the presence of base in accordance with requirements. . As inert solvent, other

than acetonitrile and N,N-dimethylformamide, the one described in process for the production 14 can be nominated for a representative example. As base, pyridine, 2,6-lutidine, collidine, 4-dimethylaminopyridine, triethylamine, N-methylmorpholine, diisopropyl ethylamine, diazabicyclo[5.4.0] undec-7-en (DBU) are nominated.

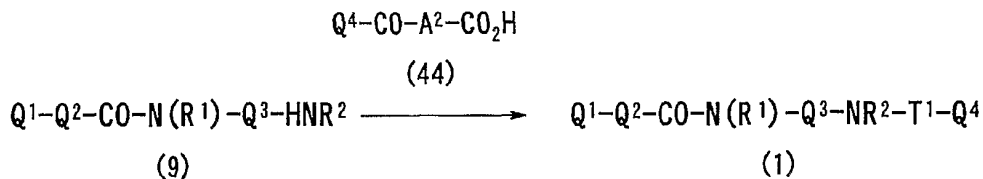


(wherein, Q¹, Q², Q³, Q⁴, R¹ and R² have the same aforesaid meanings, T¹ denotes -CO-NH-NH- group and Ph denotes phenyl group).

It is possible to produce compound (43) described in aforesaid process for the production by for example reacting arylhydrazine such as for example 4-chlorophenyl hydrazine and the like and diphenyl carbonate at room temperature-120°C in a solvent such as for example acetonitrile, N,N-dimethylformamide, dichloromethane, chloroform, tetrahydrofuran, 1,2-dimethoxyethane, dioxane, benzene, toluene and the like.

Process for Production 17

It is possible to produce compound (1) in which T¹ is -CO-A²-CO- group (wherein, A² denotes single bond or 1-5 C alkylene group) by reacting compound (9) in accordance with process for the production 2 and Q⁴-CO-A²-CO₂H (44) at -50-50°C using condensing agent in inert solvent . As condensing agent, for example N,N'-dicyclohexylcarbodiimide or 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide / hydrochloride or the like is nominated. As solvent, solvent and the like in accordance with process for the production 16 is nominated.



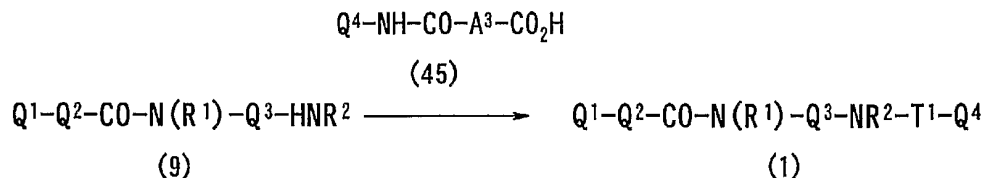
(wherein, Q¹, Q², Q³, Q⁴, R¹ and R² have the same aforesaid meanings and T¹ denotes -CO-A²-CO- group (wherein, A² denotes single bond or 1-5 C alkylene group).

Compound (44) which is described in aforesaid process for the production, in the case wherein A^2 is a single bond, can be produced by for example hydrolysing compound (example, Q^4 -CO-CO2Et) produced by Friedel / Krafts reaction of aromatic hydrocarbon such as for example chlorobenzene and the like and heteroaromatic ring such as for example thiophene and the like with chloro oxoacetate ester (example, ClCO-CO2Et) using alkali such as for example lithium hydroxide, potassium hydroxide, sodium hydroxide and the like.

Moreover, compound (44), in the case wherein A^2 is methylene group, can be produced by for example hydrolysing ketoester derivative (example, Q^4 -CO-CH₂-CO2Et) obtained by reacting aryl carbonyl chloride species such as for example 4-chlorobenzoic acid chloride and the like and heteroaryl carbonyl chloride such as for example thiophenecarbonyl chloride and the like with malonic acid monoester monocarboxylic acid potassium salt in the presence of magnesium chloride and triethylamine using alkali such as for example lithium hydroxide, potassium hydroxide, sodium hydroxide and the like. Aforesaid ketoester derivative is ethylene-ketalated carbonyl group thereof, and thereafter the carboxylic acid which is obtained by hydrolyses may be used in reaction of compound (9). Moreover, compound (44), in the case wherein A^2 is alkylene group of carbon number 2 or more, can be produced by hydrolysing ketoester derivative (example, Q^4 -CO-A₂-CO2Et) obtained by Friedel / Krafts reaction of for example aromatic hydrocarbon such as for example benzene and the like or heteroaromatic ring such as for example thiophene and the like and alkylene dicarboxylic acid monoester monochloride using alkali such as for example lithium hydroxide, potassium hydroxide, sodium hydroxide and the like.

Process for Production 18

The compound (1) wherein T^1 is CO-A₃-CO-NH-group (wherein, A^3 denotes a 1-5C alkylene group) can be produced by reacting compound (9) in accordance with process for the production 2 and Q^4 -NH-CO-A₃-CO₂H (45) at -50 to 50°C using condensing agent in inert solvent. As condensing agent, for example N,N'-dicyclohexylcarbodiimide or 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide / hydrochloride or the like is nominated. As inert solvent, alkyl halide series solvent such as dichloromethane, chloroform, carbon tetrachloride or the like, ether type solvent such as tetrahydrofuran, 1,2-dimethoxyethane, dioxane or the like, aromatic system solvent such as benzene, toluene or the like, amide system solvent and the like such as N,N-dimethylformamide or the like are nominated.

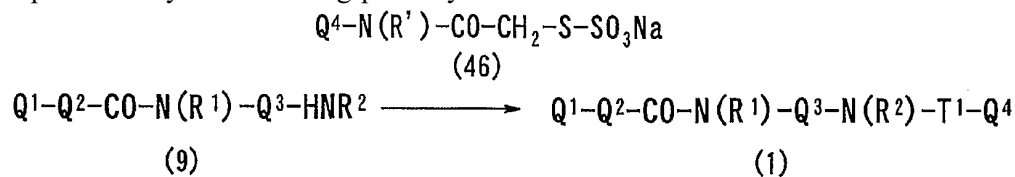


(wherein, Q¹, Q², Q³, Q⁴, R¹ and R² have the same aforesaid meanings, and T¹ denotes CO-A³-CO-group (wherein, A³ denotes a 1-5C alkylene group)).

The compound (45) can be produced by hydrolysis using alkali such as for example lithium hydroxide, potassium hydroxide, sodium hydroxide and the like, of a compound (Example, Q⁴-NH-CO-A³-CO₂Et) produced by reacting arylamine such as 4-chloroaniline and the like corresponding to Q⁴-NH₂ heteroaryl amine such as or aminopyridine and the like and alkylene dicarboxylic acid monoester monocarboxylic acid potassium salt at -50 to 50°C using condensing agent in inert solvent.

Process for Production 19

It is possible that compound (1) that T¹ is CS-CO-N(R')-group (in this group, R' has the same aforesaid definition) is produced by the following pathway.



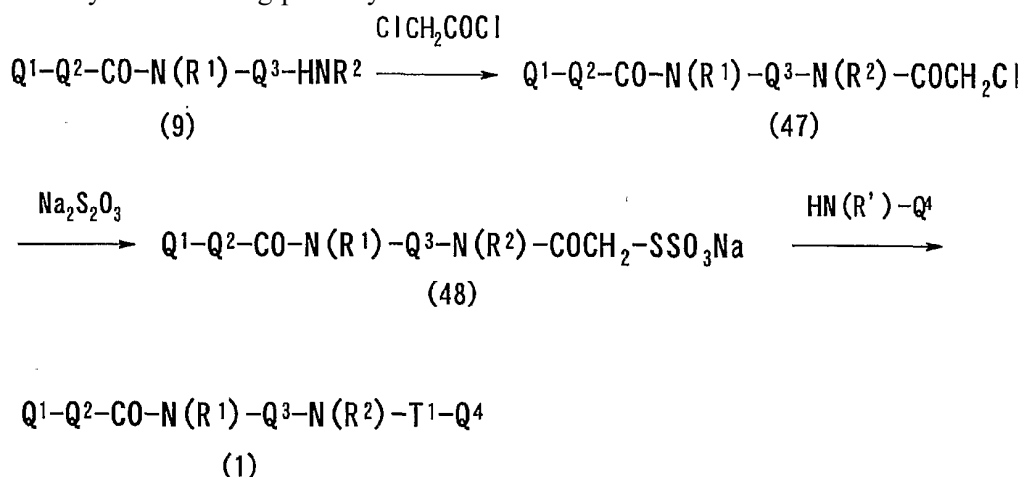
(wherein, Q¹, Q², Q³, Q⁴, R¹, R² and R' have the same aforesaid meanings, and T¹ denotes CS-CO-N(R')-group (in this group, R' has the same aforesaid definition)).

In other words, compound of this invention (1) can be produced by dissolving or suspending sodium thiosulfate salt (46) and compound (9) in solvent, and heating it. The reaction temperature is preferably 80-200°C, and around 150°C are particularly preferred. As the solvent which is used in this reaction, water, alcohol such as methanol, ethanol and the like, basic medium such as pyridine, N-methylmorpholine and the like, alkyl halide system solvent such as dichloromethane, chloroform or the like, ether type solvent such as tetrahydrofuran, 1,2-dimethoxyethane, dioxane or the like, amide system solvent such as N,N-dimethylformamide or the like can be nominated, and these solvents may be suitably mixed and used, and, as example of mixed solvent, mixed solvent or the like of methanol and dichloromethane is nominated. Moreover, in this reaction, the solvent needs not to be always refluxed,

for example, when mixed solvent of methanol and dichloromethane was used, the reaction liquor (the reaction mixture) is heated to external temperature of 150°C, and the solvent is eliminated by distillation and thereafter the residue is subsequently heated at the same temperature.

Process for Production 20

The compound (1) wherein T¹ is CO-CS-N(R')-group (in this group, R' has the same aforesaid definition) can be produced by the following pathway.



(wherein, Q¹, Q², Q³, Q⁴, R¹, R² and R' have the same aforesaid meanings, and T¹ denotes CO-CS-N(R')-group (in this group, R' has the same aforesaid definition)).

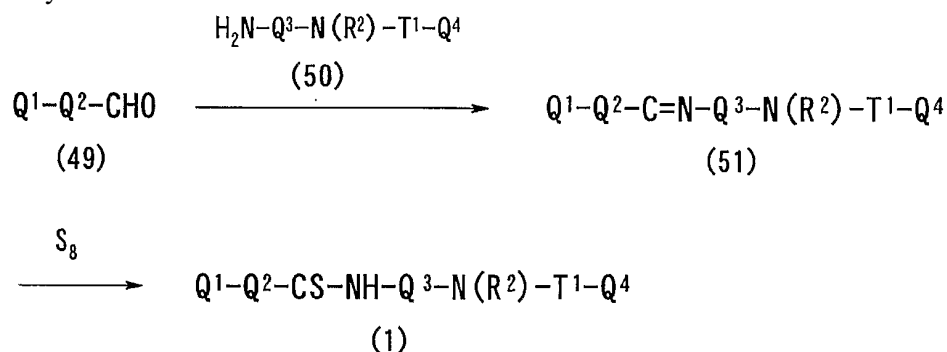
In other words, compound (9) is reacted with chloroacetyl chloride in the presence of base, and it is derived into compound (47), and thereafter, sodium thiosulfate derivative (48) can be produced by heating compound (47) in sodium thiosulfate and solvent. In other words, it is possible to produce compound of this invention (1) by heating (48) obtained in this way with amine, namely HN(R')HQ⁴.

As conditions or solvent used for the production of compound (47) from compound (9), the ones which are used widely in reaction of acid chloride with amine can be adopted. In order to produce compound (48) from compound (47), it is heated with sodium thiosulfate for 1 hours approx under reflux in solvent such as ethanol and the like. When compound (47) is a salt such as of hydrochloric acid or the like, it may be reacted in the presence of base such as sodium bicarbonate and the like. Production conditions of compound (48) need not to be restricted to one described in this place, and temperature,

kind of solvent, kind of base can be suitably changed. Reaction conditions of compound (48) and $\text{HN}(\text{R}')\text{-Q}^4$ are the same as that described with process for the production 19.

Process for Production 21

It is possible that the compound (1) wherein T^0 is thiocarbonyl group (-CS-group) is produced by the following pathway.

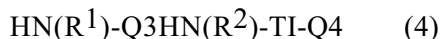


(wherein, Q^1 , Q^2 , Q^3 , Q^4 and R^2 have the same aforesaid meanings, T^1 denotes -SO₂-group -CO-group, -CO-NH-group, -CS-NH-group, -CO-NH-NH-group, -CO-CO-N(R')-group (in this group, R' has the same aforesaid definition), -CO-CS-N(R')-group (in this group, R' has the same aforesaid definition), -CS-CO-N(R')-group (in this group, R' has the same aforesaid definition), -CS-CS-N(R')-group (in this group, R' has the same aforesaid definition), -CO-A¹-N(R'')-group (in this group, A¹ and R'' has the same aforesaid definition), -CO-A²-CO-group (in this group, A² has the same aforesaid definition), -CO-A³-CO-NH-group (in this group, A³ has the same aforesaid definition), -CO-A³-CO-group (in this group, A³ has the same aforesaid definition)).

In other words, compound (49) is dehydrated with amine (50) in the presence of acid catalyst such as p-toluenesulfonic acid or the like, and it is derived into compound (51), and thereafter, compound of this invention (1) can be produced by heating in solvent such as methanol / dichloro methane liquid mixture or the like with sulfur powder. As conditions for producing compound (51) from compound (49) and amine (50), the one which is used widely for producing Schiff base in general for quasi if. As embodiments, apparatus of Dean Starck or the like is used, and it is heated under reflux in benzene or toluene in the presence of acid catalyst under condition to eliminate water from the reaction system. Moreover, molecular sieve may be used when water is eliminated from the reaction system.

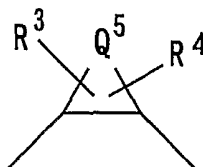
Below important intermediates described in processes for the production 1-21 of compound (1) in this invention are described.

1). Compound represented by the following general formula (4) in accordance with aforesaid process for the production 1, 3 and 11 is important as production intermediate of compound (1) in this invention.



[In the formula, R¹, R², Q³ and Q⁴ have the same aforesaid meanings, T¹ denotes carbonyl group, sulphonyl group or CO-CO-N(R')- (in the group, R' has the same aforesaid meaning)).

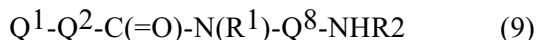
Among aforesaid intermediates, the compound wherein T¹ is group -C(=O)-C(=O)-N(R')- (in this group, R' is hydrogen atom, hydroxy group, alkyl group or alkoxy group) and also the compound wherein T¹ is carbonyl group, and Q³ is following group



is preferred.

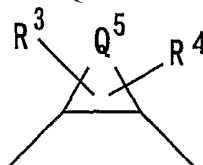
(In this group, R³ and R⁴ have the same aforesaid meanings, Q⁵ denotes group -(CH₂)_m-CH₂-A-CH₂-(CH₂)_n- (in this group, m and n each independently denote an integer of 0, 1-3, and A denotes oxygen atom, nitrogen atom, sulfur atom, -SO-, -SO₂-, -NH-, -CO-NH-, -NH-NH-, -S-NH-, -SO-NH- or -SO₂-NH-)).

2). Compound represented by the following general formula (9) in accordance with process for the production 2, 4 and 12 is important as production intermediate of compound (1) in this invention.



(wherein, R¹, R², Q¹, Q² and Q³ have the same aforesaid definition).

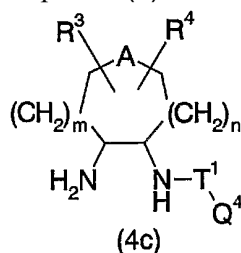
In aforesaid intermediate, the compound wherein Q³ is following group



is preferred.

(in this group, R^3 and R^4 have the same aforesaid meanings, Q^5 denotes group $-(CH_2)_m-CH_2-A-CH_2-(CH_2)_n-$ (in this group, m and n each independently denote an integer of 0, 1-3, and A denotes oxygen atom, nitrogen atom, sulfur atom, $-SO-$, $-SO_2-$, $-NH-$, $-O-NH-$, $-NH-NH-$, $-S-NH-$, $-SO-NH-$ or $-SO_2-NH-$)).

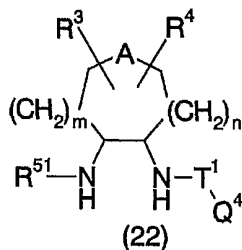
3). The following compound (4c) in accordance with process for the production 7, 11 and 13 is important as production intermediate of compound (1) in this invention.



(Wherein, Q^4 , R^3 , R^4 , A , m and n has the same aforesaid meanings, and T^1 denotes carbonyl group, sulphonyl group or $-CO-CO-N(R')$ -group (in this group, R' has the same aforesaid definition)).

The compound wherein T^1 in aforesaid formulae is $-CO-CO-N(R')$ -group in aforesaid intermediate (in this group, R' has the same aforesaid definition) and the compound wherein T^1 is carbonyl group, and A is oxygen atom, nitrogen atom, sulfur atom, $-SO-$, $-SO_2-$, $-NH-$, $-O-NH-$, $-NH-NH-$, $-S-NH-$, $-SO-NH-$ or $-SO_2-NH-$ are preferred.

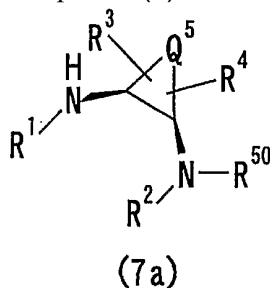
4). The following compound (22) in accordance with process for the production 8 and 13 is important as production intermediate of compound (1) in this invention.



(wherein, Q^4 , R^3 , R^4 , A, m and n have the same aforesaid meanings, T^1 denotes carbonyl group, sulphonyl group or $-\text{CO-CO-N(R}'-)$ group (in this group, R' has the same aforesaid definition) and R^{51} denotes protecting group of amino group)

Among aforesaid intermediate, a compound wherein T^1 in aforesaid formula is $-\text{CO-CO-N(R}'-)$ group (in this group, R' has the same aforesaid definition) and a compound wherein T^1 is carbonyl group, and A is oxygen atom, nitrogen atom, sulfur atom, $-\text{SO-}$, $-\text{SO}_2-$, $-\text{NH-}$, $-\text{O-NH-}$, $-\text{NH-NH-}$, $-\text{S-NH-}$, $-\text{SO-NH-}$ or $\text{SO}_2\text{-NH-}$ are preferred.

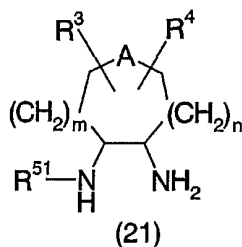
5). The following optically active compound (7a) in accordance with process for the production 6 is important as production intermediate of compound (1) in this invention.



(wherein, Q^5 , R^1 , R^2 , R^3 and R^4 have the same aforesaid meanings, and R^{50} denotes protecting group of amino group).

Among aforesaid intermediate, a compound wherein Q^5 in aforesaid formula is group $-(\text{CH}_2)_m\text{-CH}_2\text{-A-CH}_2\text{-(CH}_2)_n-$ (in this group, m and n each independently denote an integer of 0, 1-3, and A denotes an oxygen atom, nitrogen atom, sulfur atom, $-\text{SO-}$, $-\text{SO}_2-$, $-\text{NH-}$, $-\text{O-NH-}$, $-\text{NH-NH-}$, $-\text{S-NH-}$, $-\text{SO-NH-}$ or $\text{SO}_2\text{-NH-}$) is preferred.

6). The following compound (21) in accordance with process for the production 8 is important as production intermediate of compound (1) in this invention.

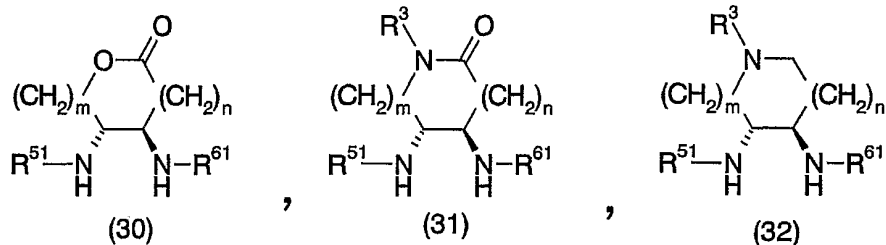


(wherein, R^3 , R^4 , A, m and n have the same aforesaid meanings, and R^{51} denotes protecting group of amino group).

Among aforesaid intermediate, a compound wherein A in aforesaid formula is oxygen atom, nitrogen atom, sulfur atom, -SO-, SO₂-, -NH-, -O-NH-, -NH-NH-, -S-NH-, -SO-NH- or SO₂-NH- is preferred.

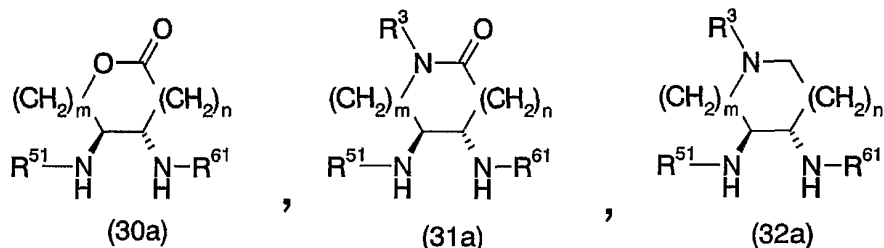
7). The following compound in accordance with a process for the production 10 is important as production intermediate of compound (1) in this invention.

In other words, the following optically active trans form compounds (30), (31) and (32),



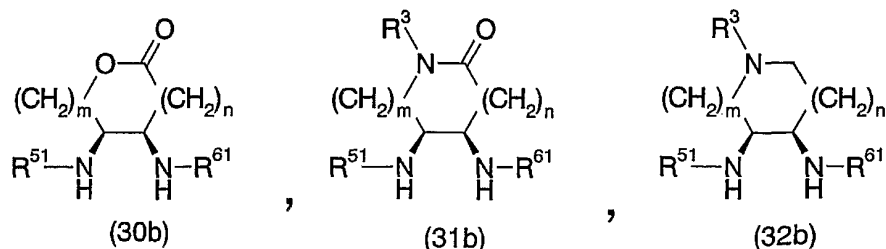
(wherein, R^3 , m and n have the same aforesaid meanings, and R^{51} and R^{61} denote protecting group of amino group)

enantiomers (30a), (31a) and (32a) of the aforesaid compound produced in the same way,



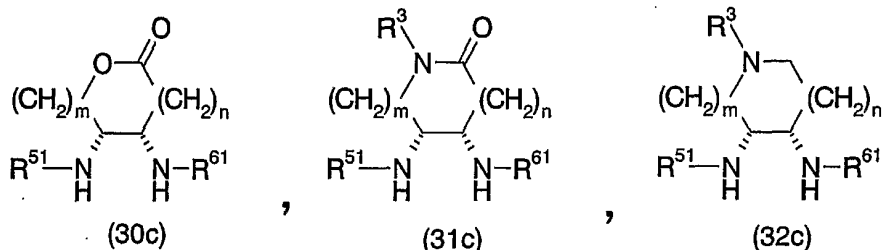
(wherein, R^3 , m and n have the same aforesaid meanings, and R^{51} and R^{61} denote protecting group of amino group)

cis form compounds (30b), (31b) and (32b),



(wherein, R^3 , m and n have the same aforesaid meanings. and R^{51} and R^{61} denote protecting group of amino group)

and enantiomers thereof (30c), (31c) and (32c)



(wherein, R^3 , m and n have the same aforesaid meanings, and R^{51} and R^{61} denote protecting group of amino group)

are important as production intermediates of compound (1) in this invention.

Because cyclic diamine derivative of this invention shows strong inhibitory action of activated blood coagulating factor X, it is useful as drug for mammal including human, activated blood coagulating factor X inhibitor, blood clotting depressant, prevention and/or therapeutic agent of thrombus or embolus, prevention and/or therapeutic drug of thrombotic disease, moreover, prevention and/or therapeutic agent of cerebral infarction, brain embolus, cardiac infarction, angina pectoris, pulmonary infarction, pulmonary embolus, Buerger's disease, deep vein thrombosis, disseminated intravascular coagulation syndrome, thrombogenesis after synthetic valve / articulation substitution, thrombogenesis and reocclusion after blood circulation reconstruction, systemic inflammatory reaction syndrome (SIRS), multiple organ dysfunction (MODS), thrombogenesis in extracorporeal circulation or blood clotting during collection of blood.

When the compounds of this invention are used as drug for human organism, dose is in a range of 1 mg - 1 g per adult per day, preferably 10 mg - 300 mg. Moreover, dose as animal use is different by a purpose of administration (prevention or treatment), kind and size of the animal which should be treated, kind of disease-causing germs infected with and a level, however, in general it is in a range of 0.1 mg - 200 mg per animal 1 kg in weight as daily dose, preferably 0.5 mg - 100 mg. This daily dose is administered by once a day or dividing into 2-4, and moreover, daily dose may exceed aforesaid quantity depending on requirement.

Medicinal composition containing the compounds of this invention can be formulated by selecting suitable formulation according to administration method with preparation method of the various formulation which is used usually. As formulation of medicinal composition comprising the compounds of this invention as a main ingredient, it can be exemplified for example tablet, powder, granule, encapsulated formulation, liquid agent, syrup, elixir agent, oily or aqueous suspensions and the like as formulation for oral.

As far as injection is concerned, stabilizer, preservatives, solubilizer may be used in formulation, and solution including these adjuvant is put in a container and it may be formed as formulation of preparation in use as solid formulation by lyophilizations. Moreover, one dose may be put in a container, and also plural doses may be put in a container.

Moreover, liquid agent, suspension, emulsion, ointment, gel, cream, lotion, spray, patch or the like can be exemplified as preparation for external use.

As far as solid formulation is concerned, it is including pharmacological permitted additive together with the compounds of this invention, for example, filler species, expander species, bonding agent species, disintegrating agent species, dissolution accelerating agent species, wetting agent species, lubricant species and the like are selected in accordance with requirements, mixed and formulated pharmaceutically.

As far as liquid formulation is concerned, solution, suspension, latex medicine or the like is nominated, and suspending agent, emulsifier or the like may be included as additive.

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