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PARK et al.(10) **Pub. No.: US 2019/0161700 A1**(43) **Pub. Date: May 30, 2019**(54) **FUNCTIONAL FLUID COMPOSITIONS****C10M 161/00** (2006.01)**C10M 169/04** (2006.01)(71) Applicants: **Kukdong Jeyen Company Limited**,
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Busan (KR)(52) **U.S. Cl.****CPC** **C10M 149/14** (2013.01); **C10M 105/14**
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2240/08 (2013.01); **C10M 169/044** (2013.01)(72) Inventors: **Jae Yoon PARK**, Seoul (KR); **Hyun**
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(57)

ABSTRACT

The present invention relates to a functional fluid composition comprising a glycol as a base material and a monoamine-based noise reducer. According to the present invention as such, the functional fluid composition comprising a glycol as a base material and a monoamine-based noise reducer represented by chemical formula 1 has an excellent noise reducing effect. In addition, the functional fluid composition of the present invention has an excellent metal corrosion inhibiting effect even, by using a monoamine-based compound as a noise reducer, when a metal corrosion inhibitor composed of a triazole-based compound without including an amine-based compound is used as a metal corrosion inhibitor.

FIG. 1

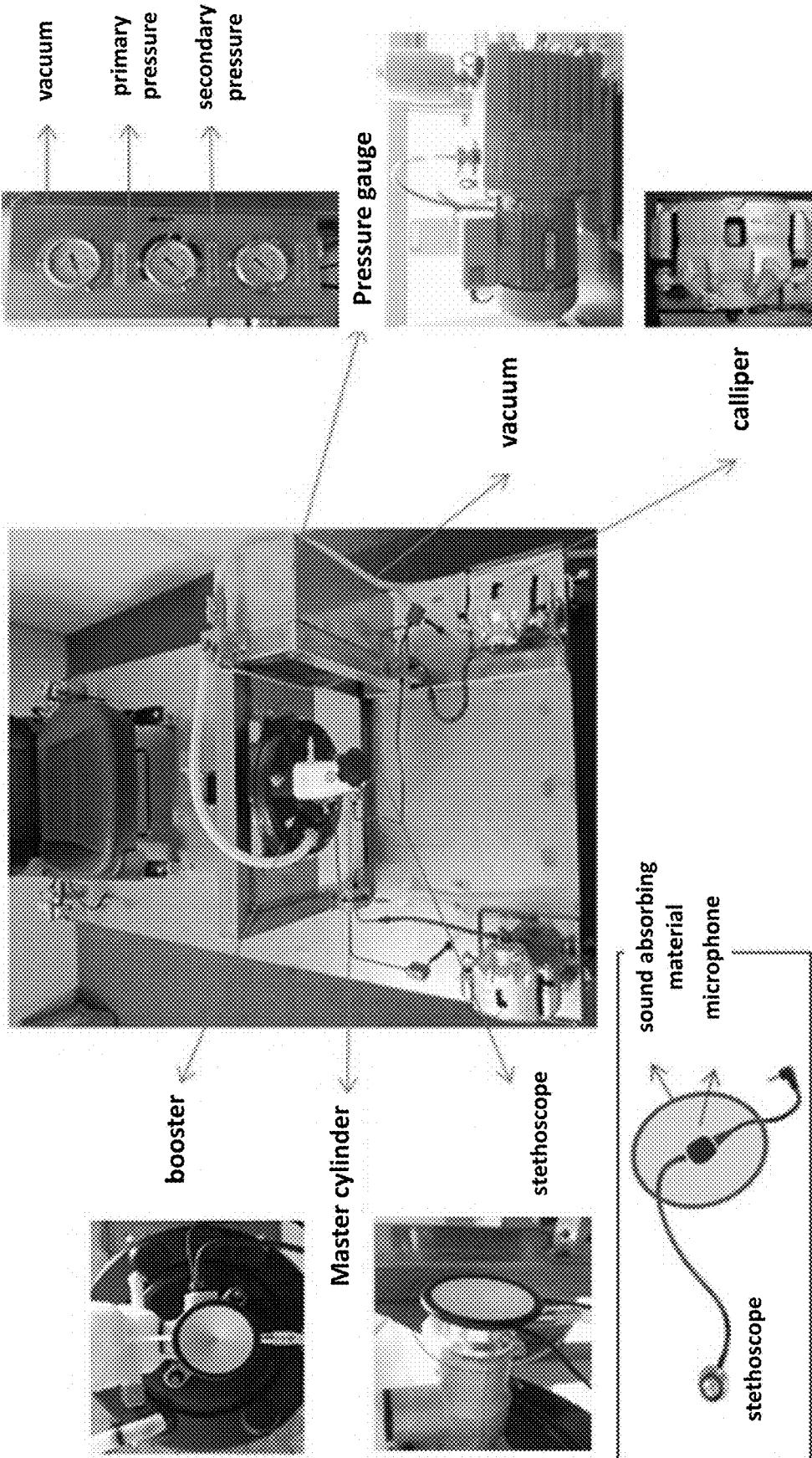


FIG. 2

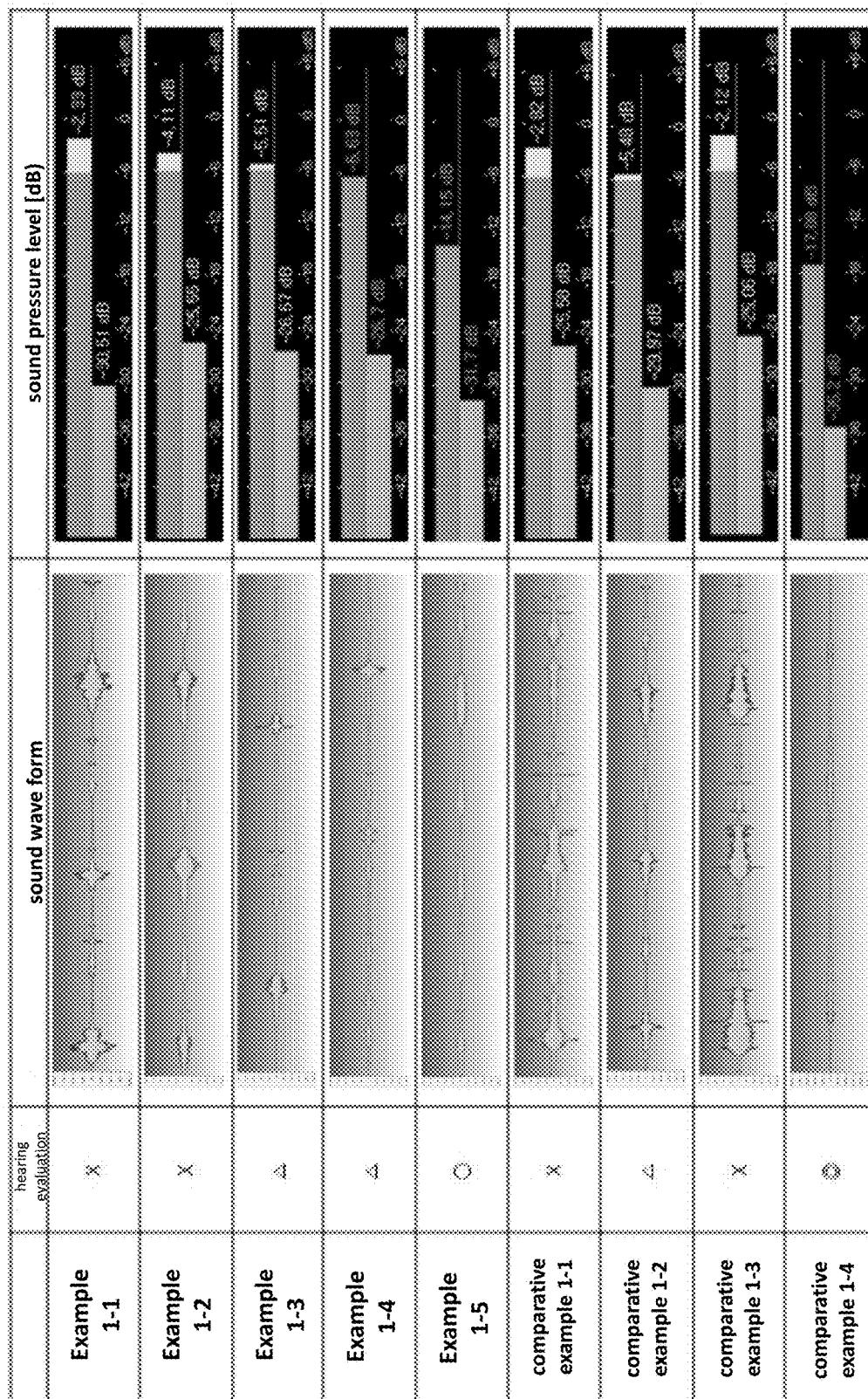
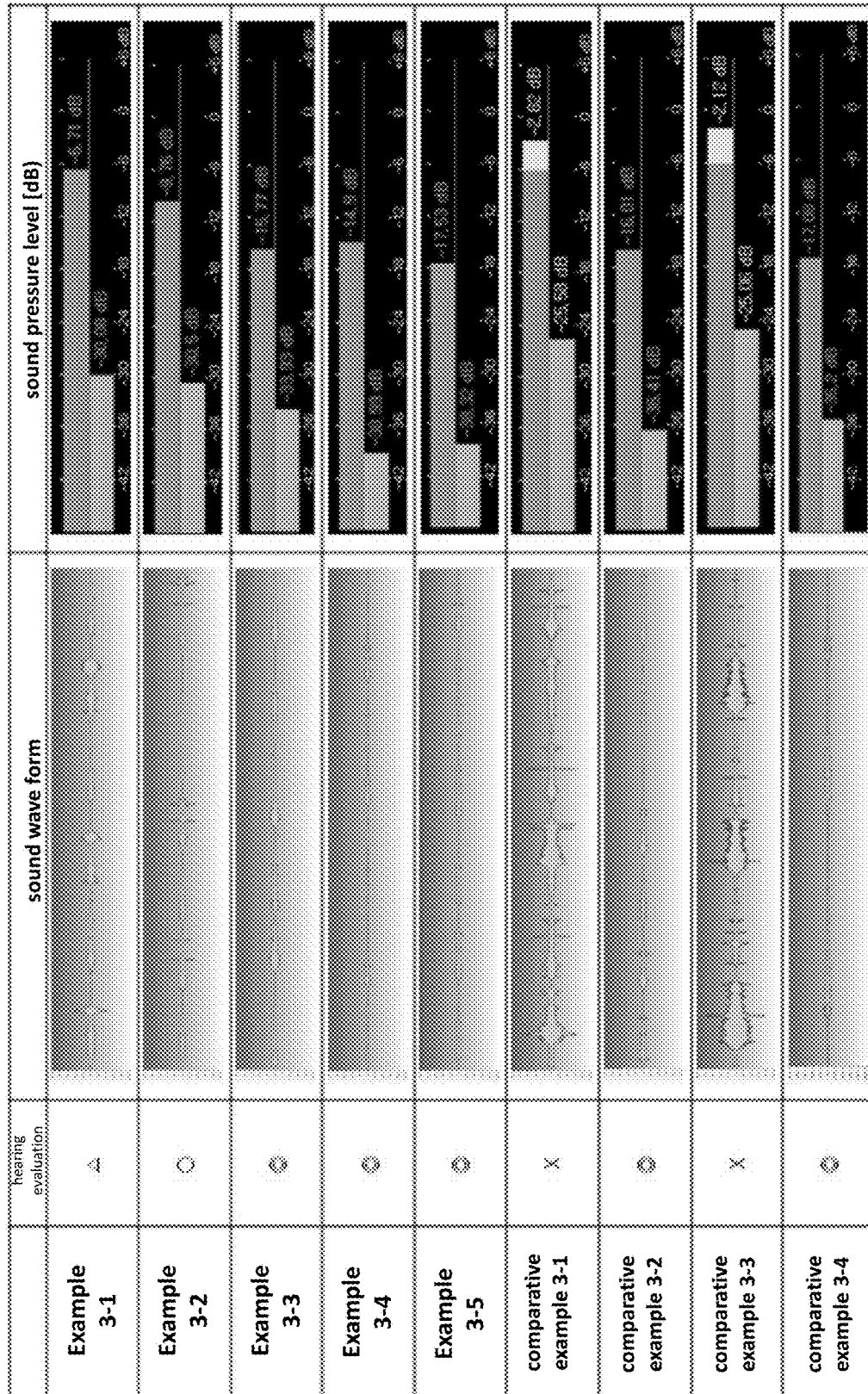


FIG. 4



FUNCTIONAL FLUID COMPOSITIONS

TECHNICAL FIELD

[0001] The present invention relates to a functional fluid composition and, more specifically, to a functional fluid composition having a glycol as a base material and a monoamine-based noise reducer.

BACKGROUND ART

[0002] The present invention relates to a functional fluid composition useful as a brake fluid. As typical automotive brake fluids, type 3 (DOT-3) brake fluid employing only a glycol ether compound as a solvent and type 4 (DOT-4) brake fluid having about 30-60 wt % of a boron ester compound further added to the type 3 (DOT-3) brake fluid are mainly used. The DOT-3 type brake fluid employs only a glycol ether compound, which is a low-molecular weight material, and thus the DOT-3 type brake fluid, when used for a long period of time, absorbs moisture in the air to lower the wet boiling point thereof, thereby causing a vapor lock phenomenon, so that there is a danger of causing a braking accident. Moreover, the DOT-3 type brake fluid has weak metal corrosion inhibiting ability over a long period of time. In addition, the DOT-4 type brake fluid employs a boron ester compound to increase the equilibrium reflux boiling point and the wet boiling point thereof, and thus the DOT-4 type brake fluid has a higher degree of safety compared with the DOT-3 type brake fluid. However, the DOT-4 type brake fluid has problems in that a boron ester-based compound is brought into contact with moisture to cause hydrolysis, so that boric acid is precipitated, causing the deterioration in physical properties of the brake fluid and the generation of foreign materials.

[0003] Therefore, the DOT-4 type brake fluid is used while an amine or silane-based type stabilizer is added to prevent the precipitation of boric acid (Korean Patent Publication No. 10-2004-0023917). However, the addition of such a stabilizer causes a significant increase in noise when a master cylinder in the brake apparatus is operated.

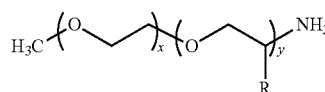
[0004] In addition, Japanese Patent Publication No. 2013-227380 discloses that a brake fluid containing a fluoride compound has a stick slip preventing effect through the improvement of lubricability. However, a fluoride compound having a lipophilic group is hard to mix with a glycol ether solvent having hydrophilicity.

DETAILED DESCRIPTION OF THE INVENTION

Technical Problem

[0005] The present inventors endeavored to develop a functional fluid composition, and as a result, the present inventors experimentally confirmed that a functional fluid composition containing a monoamine-based noise reducer represented by chemical formula 1 below has an excellent metal corrosion inhibiting effect as well as an excellent noise reducing effect, and thus the present inventors completed the present invention.

[0006] Therefore, an aspect of the present invention is to provide a functional fluid composition comprising a glycol as a base material, the composition comprising a monoamine-based noise reducer represented by chemical formula 1 below:

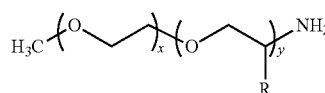


[Chemical formula 1]

wherein in chemical formula 1, X and Y are an integer of 1 or greater; and R is H or CH₃, the weight average molecular weight of the compound represented by chemical formula 1 being 600 or more.

Technical Solution

[0007] In accordance with an aspect of the present invention, there is provided a functional fluid composition comprising a glycol as a base material, the composition comprising a monoamine-based noise reducer represented by chemical formula 1 below:



[Chemical formula 1]

wherein in chemical formula 1, X and Y are an integer of 1 or greater; and R is H or CH₃, the weight average molecular weight of the compound represented by chemical formula 1 being 600 or more.

[0008] In the composition of the present invention, the glycol base material comprises a glycol compound and a boric acid ester compound.

[0009] The glycol compound may be any one known in the art, but preferably, the glycol compound is selected from the group consisting of ethylene glycol, diethylene glycol, triethylene glycol, propylene glycol, dipropylene glycol, butylene glycol, polyalkylene glycol, glycol ether, and mixtures thereof. More preferably, the glycol compound suitable for the composition of the present invention is ethylene glycol, diethylene glycol, propylene glycol, dipropylene glycol, polyalkylene glycol, or glycol ether.

[0010] The glycol ether may be any one known in the art, and preferably, the glycol ether is selected from the group consisting of ethylene glycol ethyl ether, diethylene glycol ethyl ether, triethylene glycol ethyl ether, ethylene glycol methyl ether, diethylene glycol methyl ether, triethylene glycol methyl ether, polyethylene glycol methyl ether, polyethylene glycol methyl ether, ethylene glycol butyl ether, diethylene glycol butyl ether, triethylene glycol butyl ether, polyethylene glycol butyl ether, dipropylene glycol methyl ether, polypropylene glycol methyl ether, and mixtures thereof. More preferably, the glycol ether suitable for the composition of the present invention is ethylene glycol methyl ether, diethylene glycol methyl ether, triethylene glycol methyl ether, polyethylene glycol methyl ether, ethylene glycol butyl ether, diethylene glycol butyl ether, triethylene glycol butyl ether, or polyethylene glycol butyl ether, and most preferably, triethylene glycol monomethyl ether, polyethylene glycol monomethyl ether, or polyethylene glycol monobutyl ether.

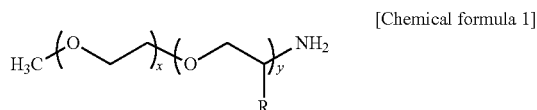
[0011] The boric acid ester compound is used to prevent the drop of a boiling point due to moisture absorption, and the boric acid ester compound is comprised in a content range of 30-60 wt % relative to 100% of the total weight of

the functional fluid composition. Here, if the amount of the boric acid ester compound used is less than the above range, a desired effect cannot be achieved. If the amount thereof exceeds the range, the production cost may be increased and boric acid may be precipitated.

[0012] According to a most preferable embodiment of the present invention, the glycol base material used in the present invention is a mixture of a polyalkylene glycol, polyethylene glycol monomethyl ether, polyethylene glycol monobutyl ether, triethylene glycol monomethyl ether and a boric acid ester compound

[0013] In the composition of the present invention, the content of the glycol base material containing a glycol compound and a boric acid ester compound is preferably 20-99 wt %, more preferably 40-99 wt %, still more preferably 60-99 wt %, still more preferably 70-99 wt %, and most preferably 85-99 wt %, based on the total weight of the functional fluid composition.

[0014] In the composition of the present invention, the monoamine-based noise reducer may be represented by chemical formula 1 below:



wherein in chemical formula 1, X and Y are an integer of 1 or greater; and R is H or CH₃.

[0015] Here, the weight average molecular weight of the compound represented by chemical formula 1 being 600 or more.

[0016] The weight average molecular weight of the compound represented by chemical formula 1 is preferably equal to or more than 600 and equal to or less than 2000, and more preferably equal to or more than 1000 and equal to or less than 2000.

[0017] Among different molecular weights (M) that may be included in the compound represented by chemical formula 1 herein, a molecular weight (M_i) of the compound that is optionally selected therefrom may be calculated by equation 1 below when R is H, and may be calculated by equation 2 when R is CH₃:

$$M_i = [31 + \{44 \times (X + Y)\}] \quad \text{[Equation 1]}$$

$$M_i = [31 + \{(44 \times X) + (53 \times Y)\}] \quad \text{[Equation 2]}$$

wherein in equations 1 and 2, X and Y are an integer of 1 or greater.

[0018] Meanwhile, the weight average molecular weight (M_w) of the compound represented by chemical formula 1 may be calculated by equation 3 below:

$$\frac{\sum n_i M_i^2}{\sum n_i M_i} \quad \text{[Equation 3]}$$

wherein in equation 3, n_i means the total number of compounds having an optional molecular weight M_i.

[0019] In the composition of the present invention, the monoamine-based compound represented by chemical formula 1 as a noise reducer may be contained in a content of

preferably 0.05-5.0 wt %, more preferably 0.1-5.0 wt %, and most preferably 0.2-5.0 wt % based on the total weight of the functional fluid composition.

[0020] According to an embodiment of the present invention, the composition of the present invention may comprise at least one additive of a metal corrosion inhibitor and an antioxidant.

[0021] The metal corrosion inhibitor may be any one known in the art, but the corrosion inhibitor used in the present invention is a triazole-based compound, an amine-based compound, or a mixture thereof.

[0022] The triazole-based compound includes various triazoles known in the art, and may be selected from the group consisting of a triazole derivative, a benzotriazole derivative, and a tolutriazole derivative. Specific examples of the benzotriazole derivative include N,N-bis(2-ethylhexyl)-4-methyl-1H-benzotriazole-1-methylamine, N,N-bis(2-ethylhexyl)-5-methyl-1H-benzotriazole-1-methylamine, octyl-1H-benzotriazole, di-tertiary butylated 1H-benzotriazole, 1H-1,2,3-triazole, 2H-1,2,3-triazole, 1H-1,2,4-triazole, 4H-1,2,4-triazole, 1-(1',2'-di-carboxyethyl)benzotriazole, 2-(2'-hydroxy-5'-methylphenyl)benzotriazole, 1H-1,2,3-triazole, 2H-1,2,3-triazole, 1H-1,2,4-triazole, 4H-1,2,4-triazole, benzotriazole, tolyltriazole, carboxybenzotriazole, 3-amino-1,2,4-triazole, chlorobenzotriazole, nitrobenzotriazole, aminobenzotriazole, cyclohexano [1,2-d] triazole, 4,5,6,7-tetrahydroxy-tolyltriazole, 1-hydroxybenzotriazole, ethylbenzotriazole, naphthotriazole, 1-[N,N-bis(2-ethylhexyl)aminomethyl]benzotriazole, 1-[N,N-bis(2-ethylhexyl)aminomethyl]tolyltriazole, 1-[N,N-bis(2-ethylhexyl)aminomethyl]carboxy benzotriazole, 1-[N,N-bis(di-ethanol)-aminomethyl]benzotriazole, 1-[N,N-bis(di-ethanol)-aminomethyl]tolyltriazole, 1-[N,N-bis(di-ethanol)-aminomethyl]carboxybenzotriazole, 1-[N,N-bis(2-hydroxypropyl)aminomethyl]carboxybenzotriazole, 1-[N,N-bis(1-butyl)aminomethyl]carboxybenzotriazole, 1-[N,N-bis(1-octyl)aminomethyl]carboxybenzotriazole, 1-(2',3'-di-hydroxypropyl)benzotriazole, 1-(2',3'-di-carboxyethyl)benzotriazole, 2-(2'-hydroxy-3',5'-di-tert-butylphenyl)benzotriazole, 2-(2'-hydroxy-3',5'-di-tert-amylphenyl)benzotriazole, 2-(2'-hydroxy-4'-octoxyphenyl)benzotriazole, 2-(2'-hydroxy-5'-tert-butylphenyl)benzotriazole, 1-hydroxybenzotriazole-6-carboxylic acid, 1-oleoylbenzotriazole, 1,2,4-triazole-3-ol, 3-amino-5-phenyl-1,2,4-triazole, 3-amino-5-heptyl-1,2,4-triazole, 3-amino-5-(4-isopropyl-phenyl)-1,2,4-triazole, 5-amino-3-mercapto-1,2,4-triazole, 3-amino-5-(p-tert-butylphenyl)-1,2,4-triazole, 5-amino-1,2,4-triazole-3-carboxylic acid, 1,2,4-triazole-3-carboxamide, 4-aminourazole, 1,2,4-triazole-5-one, and the like.

[0023] Preferably, the triazole-based compound includes at least one selected from benzotriazole, mercaptobenzotriazole, tolyltriazole, octyltriazole, decyltriazole, dodecyltriazole, and the like. More preferably, the triazole-based compound is a mixture of benzotriazole and mercaptobenzotriazole.

[0024] In the composition of the present invention, the content of the triazole compound as a metal corrosion inhibitor is 0.1-10 wt %, more preferably 0.5-5.0 wt %, and most preferably 0.5-3.0 wt %, based on the total weight of the functional fluid composition.

[0025] The amine-based compound may be selected from the group consisting of an alkanol amine, an alkyl amine and a cyclic amine. Specific examples of the alkanol amine

compound include monomethanolamine, dimethanolamine, trimethanolamine, monoethanolamine, diethanolamine, triethanolamine, monopropanolamine, dipropanolamine, tripropanolamine, monoisopropanolamine, diisopropanolamine, and triisopropanolamine; specific examples of the alkylamine compound include dibutyl amine, tributyl amine, dicyclohexyl amine, cyclohexyl amine and a salt thereof, piperazine, n-propylamine, isopropylamine, n-butylamine, isobutylamine, sec-butylamine, tert-butylamine, n-pentylamine, n-hexylamine, n-heptylamine, n-octylamine, 2-ethylhexylamine, n-nonylamine, n-decylamine, 2-propylheptyl amine, n-undecylamine, n-dodecylamine, n-tridecylamine, isotridecylamine, n-tetradecylamine, n-pentadecylamine, n-hexadecylamine, n-heptadecylamine, n-octadecylamine, n-nonadecylamine, n-eicosyl-amine, di-(n-hexyl)amine, di-(n-heptyl)amine, di-(n-octyl)amine, di-(2-ethylhexyl)amine, di-(n-nonyl)amine, di-(n-decyl)amine, di-(2-propylheptyl)amine, di-(n-undecyl)amine, di-(n-dodecyl)amine, di-(n-tridecyl)amine, di-(isotridecyl)amine, di-(n-tetradecyl)amine, di-(n-pentadecyl)amine, di-(n-hexadecyl)amine, di-(n-heptadecyl)amine, di-(n-octadecyl)-amine, di-(n-nonadecyl)amine, di-(n-eicosyl)amine, n-hexylmethylamine, n-heptyl-methylamine, n-octylmethylamine, (2-ethylhexyl)methylamine, n-nonylmethylamine, n-decylmethylamine, (2-propylheptyl)methylamine, n-undecylmethylamine, n-dodecyl-methylamine, n-tridecylmethylamine, isotridecylmethylamine, n-tetradecylmethylamine, n-pentadecylmethylamine, n-hexadecylmethylamine, n-heptadecylmethylamine, n-octa-decylmethylamine, n-nonadecylmethylamine, n-eicosylmethylamine, and the like; and examples of the cyclic amine compound include morpholine and the like.

[0026] The amine-based compound may include, preferably at least one selected from methyl amine, dibutyl amine, triethyl amine, triethanol amine, cyclohexyl amine, and the like, and may be more preferably a mixture of cyclohexyl amine and dibutyl amine.

[0027] In the composition of the present invention, the content of the amine-based compound as a metal corrosion inhibitor is 0.1-10 wt %, more preferably 0.5-5.0 wt %, and most preferably 0.5-3.0 wt %, based on the total weight of the functional fluid composition.

[0028] Meanwhile, if the content of the metal corrosion inhibitor is less, a corrosion inhibiting effect can be obtained, and if the content thereof is more, a great noise may be generated when a master cylinder is operated in the brake system. As the metal corrosion inhibitor, 0.1-1.5 wt % of a triazole-based compound and 0.5-2.5 wt % of an amine-based compound based on the total weight of the functional fluid composition may be used in a mixture.

[0029] In addition, the monoamine-based noise reducer represented by chemical formula 1 described above exhibits an excellent metal corrosion inhibiting effect as well as an excellent noise reducing effect, and thus the metal corrosion inhibitor contained in the functional fluid composition of the present invention may be composed of only a triazole-based compound without including an amine-based compound. In cases where the metal corrosion inhibitor is composed of only a triazole-based compound, the content of the triazole compound as a metal corrosion inhibitor is 0.1-10 wt %, more preferably 0.5-5.0 wt %, and most preferably 0.5-3.0 wt % based on the total weight of the functional fluid composition.

[0030] According to one embodiment of the present invention, in the functional fluid composition, the metal corrosion inhibitor is a triazole-based metal corrosion inhibitor and does not comprise an amine-based metal corrosion inhibitor.

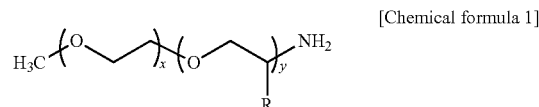
[0031] In the composition of the present invention, the antioxidant is used for the purpose of preventing oxidation, and may be any one known in the art, such as phenol-, amine-, sulfur-, and phosphorous-based antioxidants. Specific examples of the phenol-based antioxidant include 2,6-di-tert-butyl-4-methylphenol, 2,6-di-tert-butyl-p-cresol, 2,6-di-tertiary-butyl-4-sec-butyl phenol, bisphenol A, di-butylhydroxyanisole, 4,4'-butylidenebis-(6-tert-butyl-3-methylphenol), dibutylhydroxytoluene, and the like, and trimethyl dihydroquinoline or the like may be used as a quinoline antioxidant.

[0032] Preferably, 3,5-di(tert-butyl)-4-hydroxytoluene (BHT) or the like may be used. The antioxidant may be contained in a content of 0.1-2.0 wt % relative to the total weight of the functional fluid composition. If the content of the antioxidant is less, an antioxidative effect cannot be obtained, and if the content thereof is more, a great noise may be generated when a master cylinder is operated in the brake system.

Advantageous Effects

[0033] Features and advantages of the present invention are summarized as follows.

[0034] (a) The present invention provides a functional fluid composition comprising a glycol as a base material, the composition comprising a monoamine-based noise reducer represented by chemical formula 1 below:



wherein in chemical formula 1, X and Y are an integer of 1 or greater; and R is H or CH₃, the weight average molecular weight of the compound represented by chemical formula 1 being 600 or more.

[0035] (b) The functional fluid composition of the present invention can have an excellent noise reducing effect by using a monoamine-based compound as a noise reducer. In addition, the functional fluid composition of the present invention can exhibit an excellent metal corrosion inhibiting effect even when a metal corrosion inhibitor composed of a triazole-based compound without including an amine-based compound is used.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] FIG. 1 shows images illustrating a structure of a noise test device.

[0037] FIG. 2 shows the analysis of a sound waveform and a sound pressure level (dB) of the noise in examples and test example 1.

[0038] FIG. 3 shows the analysis of a sound waveform and a sound pressure level (dB) of a noise in examples and test example 2.

[0039] FIG. 4 shows the analysis of a sound waveform and a sound pressure level (dB) of a noise in examples and test example 3.

MODE FOR CARRYING OUT THE INVENTION

[0040] Hereinafter, the present invention will be described in detail with reference to examples. These examples are only for illustrating the present invention more specifically, and it will be apparent to those skilled in the art that the scope of the present invention is not limited by these examples.

Examples and Test Example 1

[0041] (1) Preparation of Functional Fluid Composition

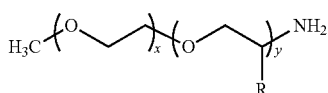
[0042] Functional fluid compositions of examples 1-1 to 1-5 and comparative examples 1-1 to 1-4 were prepared by using ingredients and compositional ratios thereof shown in table 1-1.

TABLE 1-1

Composition	Example 1-1	Example 1-2	Example 1-3	Example 1-4	Example 1-5
Polyalkylene glycol	5	5	5	5	5
Polyethylene glycol monomethylether	14	14	14	14	14
Polyethylene glycol monobutylether	13	13	13	13	13
Triethylene glycol monomethylether	11.05	11	9.1	6.1	4.1
Boric acid ester compound	53.4	53.4	53.4	53.4	53.4
Benzotriazole	0.5	0.5	0.5	0.5	0.5
Mercapto benzotriazole	0.4	0.4	0.4	0.4	0.4
BHT	0.5	0.5	0.5	0.5	0.5
Cyclohexylamine	0.6	0.6	0.6	0.6	0.6
Dibutylamine	1.5	1.5	1.5	1.5	1.5
Monoamine-based noise reducer	0.05	0.1	0.2	2	5

Composition	Comparative example 1-1	Comparative example 1-2	Comparative example 1-3	Comparative example 1-4
Polyalkylene glycol	5	5	5	5
Polyethylene glycol monomethylether	14	14	14	14
Polyethylene glycol monobutylether	13	13	13	13
Triethylene glycol monomethylether	11.1	8.2	13.2	14.6
Boric acid ester compound	53.4	53.4	53.4	53.4
Benzotriazole	0.5	0.5	0.5	
Mercapto benzotriazole	0.4	0.4	0.4	
BHT	0.5	0.5	0.5	
Cyclohexylamine	0.6			
Dibutylamine	1.5			
Monoamine-based noise reducer		2		

[0043] Meanwhile, the monoamine-based noise reducer employed a monoamine-based compound represented by chemical formula 1 below and having a molecular weight of 600 Mw.



[Chemical formula 1]

[0044] Here, the molar ratio of the compound wherein R is H and the compound wherein R is CH_3 is 9:1.

[0045] (2) Noise Test and Metal Corrosion Test

[0046] For a noise test, a noise test device shown in FIG. 1 was manufactured, and the noise level was evaluated while a brake pedal was repeatedly operated/returned.

[0047] The noise test device shown in the images of FIG. 1 is composed of: a booster unit which generates braking force by an operation of a brake pedal provided at one side of a vehicle driver seat; a master cylinder which receives the amplified force from the booster unit to generate a brake hydraulic pressure; wheel cylinders that are respectively installed on front and rear wheels to brake a car by the brake hydraulic pressure generated in the master cylinder; and an oil storage tank which supplies a brake fluid to the master cylinder and stores a brake fluid returned from the wheel cylinders. Meanwhile, the brake fluid means a functional fluid composition.

[0048] The noise test device was used to measure the level of noise, and the level of noise was scored according to the evaluation criteria in Table 1-2 below. The results are shown in Table 1-3. In addition, the sound waveform and sound pressure level (dB) of a noise were analyzed (sound analysis program, WaveLab), and the results are shown in FIG. 2.

[0049] Meanwhile, the metal corrosion was evaluated according to the test method of paragraph 5.5 of KS M 2141 and the results are shown in Table 1-3.

TABLE 1-2

Evaluation score	Noise intensity
⊙	No noise
○	Fine recognition
Δ	Recognizable
X	Unsatisfactory

TABLE 1-3

	Example 1-1	Example 1-2	Example 1-3	Example 1-4	Example 1-5
Noise	X	X	Δ	Δ	○
Metal corrosion	Good	Good	Good	Good	Good
	Comparative example 1-1	Comparative example 1-2	Comparative example 1-3	Comparative example 1-4	
Noise	X	Δ	X	⊙	
Metal corrosion	Good	Good	Cast iron corrosion	Steel, cast iron corrosion	

Examples and Test Example 2

[0050] (1) Preparation of Functional Fluid Composition

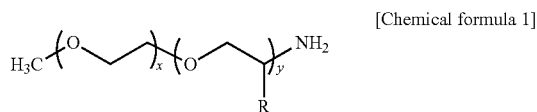
[0051] Functional fluid compositions of examples 2-1 to 2-5 and comparative examples 2-1 to 2-4 were prepared by using ingredients and compositional ratios thereof shown in table 2-1.

TABLE 2-1

Composition	Example 2-1	Example 2-2	Example 2-3	Example 2-4	Example 2-5
Polyalkylene glycol	5	5	5	5	5
Polyethylene glycol monomethylether	14	14	14	14	14
Polyethylene glycol monobutylether	13	13	13	13	13
Triethylene glycol monomethylether	11.05	11	9.1	6.1	4.1
Boric acid ester compound	53.4	53.4	53.4	53.4	53.4
Benzotriazole	0.5	0.5	0.5	0.5	0.5
Mercapto benzotriazole	0.4	0.4	0.4	0.4	0.4
BHT	0.5	0.5	0.5	0.5	0.5
Cyclohexylamine	0.6	0.6	0.6	0.6	0.6
Dibutylamine	1.5	1.5	1.5	1.5	1.5
Monoamine-based noise reducer	0.05	0.1	0.2	2	5

Composition	Comparative example 2-1	Comparative example 2-2	Comparative example 2-3	Comparative example 2-4
Polyalkylene glycol	5	5	5	5
Polyethylene glycol monomethylether	14	14	14	14
Polyethylene glycol monobutylether	13	13	13	13
Triethylene glycol monomethylether	11.1	8.2	13.2	14.6
Boric acid ester compound	53.4	53.4	53.4	53.4
Benzotriazole	0.5	0.5	0.5	
Mercapto benzotriazole	0.4	0.4	0.4	
BHT	0.5	0.5	0.5	
Cyclohexylamine	0.6			
Dibutylamine	1.5			
Monoamine-based noise reducer		2		

[0052] Meanwhile, the monoamine-based noise reducer employed a monoamine-based compound represented by chemical formula 1 below and having a molecular weight of 1000 Mw.



[0053] Here, the molar ratio of the compound wherein R is H and the compound wherein R is CH₃ is 3:19.

[0054] (2) Noise Test and Metal Corrosion Test

[0055] The noise test and the metal corrosion test were carried out by the same method and criteria as in examples and test example 1. The results are shown in Table 2-2. Meanwhile, the sound waveform and sound pressure level (dB) of a noise were analyzed (sound analysis program, WaveLab), and the results are shown in FIG. 3.

TABLE 2-2

	Example 2-1	Example 2-2	Example 2-3	Example 2-4	Example 2-5
Noise	Δ	○	⊙	⊙	⊙
Metal corrosion	Good	Good	Good	Good	Good
	Comparative example 2-1	Comparative example 2-2	Comparative example 2-3	Comparative example 2-4	
Noise	X	⊙	X	⊙	
Metal corrosion	Good	Good	Cast iron corrosion	Steel, cast iron corrosion	

Examples and Test Example 3

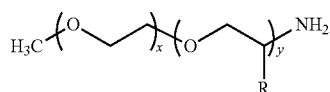
[0056] (1) Preparation of Functional Fluid Composition

[0057] Functional fluid compositions of examples 3-1 to 3-5 and comparative examples 3-1 to 3-4 were prepared by using ingredients and compositional ratios thereof shown in table 3-1.

TABLE 3-1

Composition	Example 3-1	Example 3-2	Example 3-3	Example 3-4	Example 3-5
Polyalkylene glycol	5	5	5	5	5
Polyethylene glycol monomethylether	14	14	14	14	14
Polyethylene glycol monobutylether	13	13	13	13	13
Triethylene glycol monomethylether	11.05	11	9.1	6.1	4.1
Boric acid ester compound	53.4	53.4	53.4	53.4	53.4
Benzotriazole	0.5	0.5	0.5	0.5	0.5
Mercapto benzotriazole	0.4	0.4	0.4	0.4	0.4
BHT	0.5	0.5	0.5	0.5	0.5
Cyclohexylamine	0.6	0.6	0.6	0.6	0.6
Dibutylamine	1.5	1.5	1.5	1.5	1.5
Monoamine-based noise reducer	0.05	0.1	0.2	2	5
	Comparative example 3-1	Comparative example 3-2	Comparative example 3-3	Comparative example 3-4	
Polyalkylene glycol	5	5	5	5	
Polyethylene glycol monomethylether	14	14	14	14	
Polyethylene glycol monobutylether	13	13	13	13	
Triethylene glycol monomethylether	11.1	8.2	13.2	14.6	
Boric acid ester compound	53.4	53.4	53.4	53.4	
Benzotriazole	0.5	0.5	0.5		
Mercapto benzotriazole	0.4	0.4	0.4		
BHT	0.5	0.5	0.5		
Cyclohexylamine	0.6				
Dibutylamine	1.5				
Monoamine-based noise reducer		2			

[0058] Meanwhile, the monoamine-based noise reducer employed a monoamine-based compound represented by chemical formula 1 below and having a molecular weight of 2000 Mw.



[Chemical formula 1]

[0059] Here, the molar ratio of the compound wherein R is H and the compound wherein R is CH₃ is 10:31

[0060] (2) Noise Test and Metal Corrosion Test

[0061] The noise test and the metal corrosion test were carried out by the same method and criteria as in examples and test example 1. The results are shown in Table 3-2. Meanwhile, the sound waveform and sound pressure level (decibel, dB) of a noise were analyzed (sound analysis program, WaveLab), and the results are shown in FIG. 4.

TABLE 3-2

	Example 3-1	Example 3-2	Example 3-3	Example 3-4	Example 3-5
Noise	X	○	⊗	⊗	⊗
Metal corrosion	Good	Good	Good	Good	Good
	Comparative example 3-1	Comparative example 3-2	Comparative example 3-3	Comparative example 3-4	
Noise	X	⊗	X	⊗	
Metal	Good	Good	Cast iron	Steel.	

TABLE 3-2-continued

corrosion	corrosion	cast iron corrosion
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[0062] For reference, the method for evaluating metal corrosion according to the test method of paragraph 5.5 of KS M 2141 is as follows.

[0063] (1) Corrosion Test Method

[0064] Metal test pieces (tinned iron, steel, aluminum, cast iron, brass, copper) polished with 320A silicon carbide to avoid surface impressions were prepared with a surface area of 25.5 cm². The respective metal pieces were weighed to 0.1 mg, and then were brought into electric contact with each other through bolt assembling.

[0065] The assembled metal pieces and a standard SBR cup were placed in a 475 ml-volume glass bottle, and a brake fluid mixed with 5 vol % of distilled water was allowed to fill 400 ml. The glass bottle was tightly closed with a tin-plated iron lid having a ventilation hole (0.8 ± 0.1 mm in diameter, and then placed in an oven at $100 \pm 2^\circ \text{C}$. for 120 ± 2 hours.

[0066] The bottle was cooled at room temperature for 60-90 minutes, and then the metal pieces were immediately taken out, washed water, and then wiped with a cloth wetted with 95% ethanol one by one. The metal pieces were inspected for corrosion or impression marks.

[0067] Meanwhile, the metal test pieces and the brake fluid test cup used in the corrosion test are shown in tables 4 and 5 below.

TABLE 4

Metal test pieces listed in Annex B of KS M 2141				
Copper plate corrosion	Material standard	General material data	Dimension	Surface requirements
Tinned iron	ASTM A-624 Fed. Spec. QQ-T-425A	Tinplate, Electrolytic bright sr type Mr. T-3 No. 2885 IB		As purchased As sheared. Clean and uniform tinning
Steel	SAE 1018	Low carbon sheet, Cold rolled Hardness 40HB-72HB		≈0.2 cm Edge machined to remove shearing marks, clean uniform surfaces
Aluminum	SAE AA 2024	Wrought aluminum alloy, temper T-3, hardness: 75B typical		≈0.2 cm Edge machined to remove shearing marks, clean uniform surfaces
Cast iron	SAE G 3000	automotive cast iron. Shall be free from shrinkage cavities, porosity or any other defects detrimental to specification use of the material. Hardness: 86HB-98HB	Length ≈ 8 cm Width ≈ 1.3 cm Surface area ≈ (25 ± 2) cm ²	≈0.4 cm Surface grind sides to dimension using well-dressed No. 80 alundum wheel, clean uniform surfaces
Brass	SAE CA 260	wrought alloy-yellow brass rolled sheet or piece, Hardness: 54HB-74HB		≈0.2 cm Edge machined to remove shearing marks, clean uniform surfaces
Copper	SAE CA 114	Cold-rolled copper sheet or piece,		≈0.2 cm Edge machined to remove shearing

TABLE 4-continued

Metal test pieces listed in Annex B of KS M 2141				
Copper plate corrosion	Material standard	General material data	Dimension	Surface Thickness requirements
		Hardness: 35HB-56HB		marks, clean uniform surfaces

Note:
Drill hole with 4 mm-5 mm in diameter and aapprox. 6 mm from one end of each piece. Holes shall be clean and free from burrs.
Hardness range are commercial for the designated metals. Hardness is not specified for the tinned iron because it is not considered a practical requirement.
Test pieces (strips) can be obtained from Society of Automotive Engineers Inc., 400 Commonwealth Drive, Warrendale, Pa. 15096, USA or Laboratoire de Recherches et de controle du caoutchouc, 12 rue Crves, 9212D montrouge, France.

TABLE 5

Brake fluid test cup defined in annex A of KS M 2141	
Ingredient	Weight ratio
SBR 1503 ^a form	100
Oil furnace black (NBS 378)	40
Zinc oxide (NBS 370)	5
Sulfur (NBS 371)	0.25
Stearic acid (NBS 372)	1
N-tertiary-butyl-2-benzothiazole sulphenamide (NBS 384)	1
Symmetrical-dibetanaphthyl-p-phenylenediamine	1.5
Dicumyl peroxide (40% on precipitated CaCO ₃) ^b	4.5
Total	153.25

Note:
The ingredient list (NBS . . .) should have the same technical characteristics as ones provided by the National Bureau of Standards (U.S.A.).
^aPhilprene 1503 is suitable.
^bused within 90 days after preparation and stored at a temperature of 27° C. or less.

[0068] (2) Corrosion Evaluation Method

[0069] When the brake fluid was tested according to the corrosion test method, the weights of the test pieces were measured by the unit of 0.1 mg, and the variation (mg/cm²) was calculated according to the equation 4.

[0070] The weight change should not exhibit the corrosion exceeding the reference values shown in Table 6 below. The outer contact surface of the metal piece should not be impressed or roughened enough to be visible to the naked eye. However, the metal piece was allowed to be stained or decolorized.

[0071] The brake fluid/water mixture should not be hardened at (23±5°) C. at the end of the test, and the formed crystalline precipitates should not stick to the wall of the glass bottle or the surface of the metal piece. The mixture should not contain 0.1 vol % or more of precipitate, and the pH of the mixture should be equal to or higher than 7.0 and equal to or lower than 11.5.

Variation = $\frac{\text{weight before test} - \text{weight after test}}{\text{surface area}}$ [Equation 4]

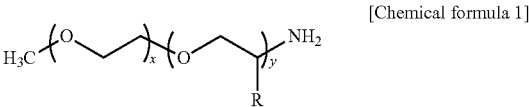
TABLE 6

Test piece	Maximum allowable weight change (mg/cm ² , surface area)
Tinned iron	0.20
Steel	0.20

TABLE 6-continued

Test piece	Maximum allowable weight change (mg/cm ² , surface area)
Aluminum	0.10
Cast iron	0.20
Brass	0.40
copper	0.40

1. A functional fluid composition comprising a glycol as a base material, the composition comprising a monoamine-based noise reducer represented by chemical formula 1 below:



wherein in chemical formula 1, X and Y are an integer of 1 or greater; and R is H or CH₃, the weight average molecular weight of the compound represented by chemical formula 1 being 600 or more.

2. The functional fluid composition of claim 1, wherein the weight average molecular weight of the compound represented by chemical formula 1 is equal to or more than 600 and equal to or less than 2000.

3. The functional fluid composition of claim 1, wherein the monoamine-based noise reducer of chemical formula 1 is comprised in a content of 0.05-5.0 wt % based on the total weight of the functional fluid composition.

4. The functional fluid composition of claim 1, wherein the monoamine-based noise reducer of chemical formula 1 is comprised in a content of 0.1-5.0 wt % based on the total weight of the functional fluid composition.

5. The functional fluid composition of claim 1, wherein the monoamine-based noise reducer of chemical formula 1 is comprised in a content of 0.2-5.0 wt % based on the total weight of the functional fluid composition.

6. The functional fluid composition of claim 1, wherein the composition further comprises at least one additive selected from a group consisting of a metal corrosion inhibitor and an antioxidant.

7. The functional fluid composition of claim 6, wherein the metal corrosion inhibitor is a triazole-based metal corrosion inhibitor and does not comprise an amine-based metal corrosion inhibitor.