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PRESERVATIVE COMPOSITION

Eldon A. Behr, Memphis, Tenn., assignor to Chapman Chemical Company, Memphis, Tenn., a corporation of Illinois

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This invention relates to a method and composition for preservation of wood, particle board, hard board, and related structural fibrous materials, which method and composition are designed to increase the performance in wood preservation, simplify the application to the wood and improve the overall results obtained.

There are many methods of applying preservatives to wood prior to the time the wood is put in use. The composition of the instant invention may have utility in this respect, although it is intended primarily for use on wood already in place, such as poles, posts, sills, toe plates, stair risers, etc.; and the instant invention will be described primarily in connection with this use.

One of the chief uses for the present invention is in extending the usable life of poles already in line. Some of these poles may have been in place many years and the application of the instant composition thereto will add extra years of life to the pole. Those poles which were poorly pretreated or pretreated with inferior preservatives may be again treated, while in place, with the instant composition along the pole. Poles which are removed from one location to be set in another, usually at a different depth, can be advantageously treated with the composition of the instant invention.

The instant composition is a grease, or a grease-like material, which may be applied by hand spreading, by a mechanical grease gun, or on a paper or plastic film or bandage. On poles it is applied at the ground line area, where rot is most likely to occur. There are at present several wood preservative greases known and in use. Each of these leaves something to be desired, however. The composition of the instant invention overcomes most of the difficulties or problems encountered in the use of the prior art compositions. For example, in British Patent No. 699,207 (published November 4, 1953), reference is made to a grease-like substance which can be applied to wooden objects along the ground line, and the greases described by the British patent are oil base materials thickened with soaps such as aluminum or calcium stearate. Such greases are difficult to manufacture; and they have the disadvantage that the number of oils that can be used as the solvent for the active fungicide is limited. Also, such greases have a tendency to bleed at room temperature and at elevated temperatures frequently encountered in storage and in the field during summer. In addition, the preservative portion of such greases sometimes does not penetrate the wood well enough.

Other preservative gels or greases now on the market have various disadvantages which have been overcome by the product of the instant invention. These disadvantages include poor resistance to water, inadequate penetration of the wood, difficulty of application, high cost, doubtful preservative value, bleeding of the fluid, and a tendency to change in consistency.

In the instant invention, an organic wood preservative liquid containing an alkaline inorganic alkali metal salt is thickened with a compound of bentonite and an organic-nitrogen base, in an amount sufficient to impart a grease-like consistency to the composition, and this grease-like composition is applied to wood. It has been found that the thickening compound of bentonite and an organic-nitrogen base has unique properties in that it is capable of imparting the desired consistency to the grease-like

composition, while (in combination with the alkali metal salt) permitting penetration of the wood preservative to a sufficient extent into wood to which the grease is applied. This thickening compound produces a distinctly superior grease in that bleeding is substantially eliminated. Also, the material is easily compounded and applied.

It is, therefore, an important object to provide an improved composition and method for wood preservation.

It is a further object of the instant invention to provide an improved grease-like wood-preserving composition that does not tend to bleed, possessing superior penetration of wet wood.

It is another object of the instant invention to provide an improved grease-like composition that is easily applied to wood for the preservation thereof, comprising an organic wood preservative liquid containing an alkaline inorganic alkali metal salt and a thickening compound of bentonite and an organic-nitrogen base.

Yet another object of the instant invention is to provide an improved method of preserving wood that comprises milling or subjecting to shear a composition comprising an organic wood preservative liquid and a thickening compound of bentonite and an organic-nitrogen base (with one of many standard colloid mills or homogenizers), admixing an alkaline inorganic alkali metal salt and applying the composition to the wood.

Other and further objects, features and advantages of the present invention will become apparent to those skilled in the art from the following detailed disclosure thereof.

The invention consists in a wood preservative composition comprising an organic wood-preservative liquid, an alkaline inorganic alkali metal salt and a compound of bentonite and an organic-nitrogen base in an amount sufficient to impart a grease-like consistency to said composition.

The organic wood-preservative liquid used in the practice of the instant invention acts as a diluent for the composition and additionally functions as a spreading agent for the final composition. This liquid may be a solution of a wood preservative in an organic liquid carrier (such as a solution of pentachlorophenol in an aromatic petroleum oil or a solution of copper naphthenate in mineral spirits) or it may be a liquid preservative per se as in the case of creosote. Whatever such liquid is used, however, it preferably contains an appreciable amount of pentachlorophenol. By "creosote" is meant materials so designated by chemists which are, in fact, organic mixtures derived from coal tar or wood tar and prepared commercially as wood-preserving liquids, examples of which include coal tar creosote, coke oven tar creosote, water gas tar creosote, petroleum oil creosote, wood creosote, and mixtures thereof. Each of such creosotes may be used in the practice of the instant invention and they may be used with or without additional solvents or carriers, such as petroleum oil; or they may be used with additional preservatives such as copper naphthenate or pentachlorophenol.

The amount of organic wood preservative liquid in the final composition of the invention depends to a substantial extent upon the viscosity of this liquid and also the nature of the molecules composing the liquid; and it may range from about 60% for other thin liquids to as much as about 90–94% for thick liquids. (As used herein, the terms "percent" and "parts" mean percent and parts by weight, unless otherwise designated.)

As mentioned, the organic wood-preservative liquid used in the practice of the invention may be a liquid preservative per se such as creosote. Also, it may be a preservative such as a polyvalent metal naphthenate such as zinc or copper naphthenate dissolved in a suitable (preferably non-polar) solvent, such as a mineral oil.

The preferred organic wood preservative liquid of this type is a solution of copper naphthenate in a mineral oil; and the resulting grease-like composition preferably contains at least 2% of the metal (Cu) and preferably 10% to 30% of the copper naphthenate is used.

The organic fungicide found to be most desirable for use in the practice of the instant invention is pentachlorophenol. The amount of pentachlorophenol in the final grease-like composition should be at least about 2% and is preferably within the range of 5% to 30% of the weight of the composition. The pentachlorophenol is incorporated in a wood-preservative liquid first and the thickening agent is added subsequently. The solvent used for pentachlorophenol in the liquid is preferably a mineral oil; and the best results are obtained using an aromatic petroleum oil or sometimes called an aromatic gas oil or a heavy or light recycle oil. A preferred oil is a heavy recycle oil having a boiling point of about 600–760° F. Other oils which may also be used include cracking stocks, slurry oils, heavy aromatic gas oils and medium aromatic gas oils, examples being Amoco heavy thermal side cut No. 105, Amoco No. 102E oil, Tidewater No. 200 diesel oil, Tidewater CGB oil, Denver No. 3 oil, Magnolia lube oil extract No. 465E, aromatic HB oil, heavy aromatic naphtha, Shell medium aromatic oil, and Deep Rock heavy cycle oil. Other solvents for the organic fungicides here mentioned include naphthenic oils, petroleum tar gas oil, linseed oil, xylene, mineral spirits and butyl Cellosolve. The last mentioned solvent will dissolve up to 60% pentachlorophenol and can be used to make a grease containing 50% pentachlorophenol for special purposes. An aromatic petroleum oil such as aromatic HB is ordinarily preferred for use in the practice of the instant invention with pentachlorophenol, because of proper viscosity and good solvent power for pentachlorophenol.

The thickening agent employed in the practice of the instant invention for obtaining a grease-like consistency in the final composition is a compound of bentonite and an organic-nitrogen base. Bentonite compounds are composed of a montmorillonite mineral in which at least a part of the cation content of the mineral has been replaced by an organic-nitrogen base. Clays that swell at least to some extent on being contacted with water and contain as a primary constituent a mineral of the group known as montmorillonites are generally referred to as bentonite. Such clays, which contain exchangeable alkali metal atoms either naturally or after treatment, constitute the raw materials employed in making the bentonite-organic base compounds used in the practice of the instant invention. The bentonite-organic base compounds are preferably prepared as described in U.S. Patent No. 2,033,856, issued March 10, 1936, by bringing together the bentonite and the organic-nitrogen base in the presence of aqueous mineral acid to effect base exchange. The organic-nitrogen bases include cyclic, aliphatic and heterocyclic amines, such as decyl amine, dodecyl amine, tetra decyl amine, hexadecyl amine, octadecyl amine, hexadecyl ammonium acetate, octadecyl ammonium acetate, dimethyl dioctyl ammonium acetate, dimethyl didodecyl ammonium acetate, dimethyl dodecyl hexadecyl ammonium acetate, dimethyl diacetyl ammonium acetate, dimethyl hexadecyl octadecyl ammonium acetate, dimethyl dioctadecyl ammonium acetate, and the corresponding chlorides and quaternary ammonium chlorides. The preferred bentonite compounds are prepared from quaternary ammonium compounds in which the N-substituents are aliphatic groups containing at least one alkyl group with a total of at least ten to twelve carbon atoms. When aliphatic amines are used they preferably contain at least one alkyl group containing at least ten to twelve carbon atoms.

Although the bentonite compounds are particularly useful in the practice of the instant invention as thickeners for the final grease composition, it will be noted that some of the bentonite compound may be replaced by inert inorganic fillers such as finely divided silica, diatomaceous earth, and finely divided calcium silicate. In general, the total amount of bentonite compound and inorganic filler (if any is used) should be such as to effect the desired thickening of the composition and this amount may range from about 5% to about 40% of the final composition. The weight ratio of bentonite compound to the inorganic filler may range from 1:10 to 10:1.

In addition, a dispersing agent is preferably employed with the bentonite compound. The amount of dispersing agent employed is 0.5% to 5% of the final grease composition, or 5 to 25% of the amount of bentonite compound used. The dispersing agent is an organic polar solvent such as methanol, acetone or the like (preferably a low molecular weight alcohol, ketone or ester containing not more than about 4 carbon atoms such as methanol, ethanol, isopropanol, butanol, acetone, diethyl ketone, methyl acetate, ethyl acetate, etc.). In the practice of the instant invention the dispersing agent is added to the composition after the bentonite compound, but before any inert filler materials are added.

Another ingredient which has been found to be of particular importance in improving the penetration in the case of wet wood is an alkaline inorganic alkali metal salt. Such salts exclude substantially neutral salts such as sodium chloride, but include the alkaline salts of the alkali metals (i.e. sodium and potassium) such as sodium fluoride, sodium carbonate, borax (i.e. sodium tetraborate), sodium bicarbonate, potassium carbonate, and potassium fluoride. The group of compounds found to be most useful for this purpose are sodium and potassium fluorides, carbonates, bicarbonates and tetraborates. Sodium fluoride is preferred. Such salts are preferably added with the inorganic filler (if any), after the addition of the other ingredients. Such salts may be employed in amounts ranging from 0.5 to 20% of the final grease-like composition, and preferably in amounts ranging from 1 to 10% thereof.

It has been found that there is a unique synergistic effect resulting from the combination of such inorganic salts, the compound of bentonite and an organic-nitrogen base, and the organic wood-preservative liquid, containing pentachlorophenol. This combination of ingredients achieves distinctly superior penetration of the pentachlorophenol into the wood, particularly when the wood is quite moist, for example, having a moisture content of 20 to 50%. For example, it has been found that the penetration of pentachlorophenol at an appreciable distance from the outer surface of the wood may be as much as 6 to 7% greater if the alkaline inorganic salt is incorporated in the grease-like composition.

In the practice of the instant invention, the organic wood-preservative liquid is first provided (in the form of creosote) or prepared by dissolving the organic fungicide in a suitable solvent therefor such as a mineral oil. Then the bentonite compound is added and stirred into the liquid. Next, the relatively small quantity of methanol, acetone or other organic polar solvent used as a dispersing agent is added. Then, any suitable inorganic filler material to be employed is added. The resulting material is a liquid slurry, which is then passed through a homogenizer or colloid mill wherein it is subjected to 1000 to 8000 pounds per square inch of shear and the slurry is converted to a grease-like gel. Inorganic filler, if used, plus the alkaline inorganic alkali metal salt is preferably added next.

The foregoing procedure is carried out using the following formulations (which are prepared initially without the inorganic salt) and the results indicated in connection with each of these examples are the results obtained.

EXAMPLE 1

	Percent
Dioctadecyldimethyl ammonium bentonite	10.0
Methanol	0.7
Shell medium aromatic oil	79.3
Pentachlorophenol	10.0

ASTM penetration: 400; bleeding resistance and resistance to water good; and penetration into wood good.

EXAMPLE 2

Dicetyldimethyl ammonium bentonite	10
Aromatic HB oil	78.6
Pentachlorophenol	10
Acetone	1.4

ASTM penetration: 294; bleeding resistance excellent, resistance to water satisfactory, penetration into wood satisfactory.

EXAMPLE 3

Dicetyldimethyl ammonium bentonite	7.5
Aromatic HB oil	81.8
Methanol	0.7
Pentachlorophenol	10.0

ASTM penetration: 312, all other properties excellent.

EXAMPLE 4

Dicetyldimethyl ammonium bentonite	7.0
Heavy aromatic naphtha	82.3
Methanol	0.7
Pentachlorophenol	10.0

ASTM penetration: 400; slight but unobjectionable bleeding, all other properties excellent.

EXAMPLE 5

Dicetyldimethyl ammonium bentonite	3.5
Aromatic HB oil	72.5
Methanol	1.0
Pentachlorophenol	10.0
Silica (Hi-Sil 233)	13.0

ASTM penetration: 240; all other properties excellent.

EXAMPLE 6

Dicetyldimethyl ammonium bentonite	10.0
Coal tar creosote	44.3
Heavy aromatic naphtha	40.0
Pentachlorophenol	4.3
Methanol	1.4

ASTM penetration: 400; all other properties excellent.

EXAMPLE 7

Dicetyldimethyl ammonium bentonite	7.0
Tidewater diesel oil	86.1
Methanol	2.4
Pentachlorophenol	4.5

ASTM penetration: 400; all other properties good.

EXAMPLE 8

Dicetyldimethyl ammonium bentonite	3.0
Aromatic HB	77.7
Methanol	0.7
Pentachlorophenol	8.6
Calcium silicate (Microcel-E)	10.0

ASTM penetration: 311; all other properties good.

EXAMPLE 9

Octadacyl amine bentonite	12.5
Aromatic HB	74.2
Pentachlorophenol	8.3
Methanol	5.0

ASTM penetration: 331; all other properties good.

EXAMPLE 10

	Percent
Dicetyldimethyl ammonium bentonite	7.0
Deep Rock heavy cycle	83.1
Pentachlorophenol	9.2
Methanol	0.7

ASTM penetration: 400; all other properties good.

The National Lubricating Grease Institute developed and adopted a consistency classification in 1941. This classification, which is based on penetrations obtained by ASTM Method D–217, is shown in Table 21.1. When the Federal Government put in effect a tax on lubricating oils (see Regulation 44, Section 314.40, Use of Terms) the above method of test was recognized, as can be seen from the following quotation: "The term 'lubricating oils' does not include products of the type commonly known as grease. Oleaginous substances which are classed as grease and which contain oil are not subject to the tax when of a worked consistency of less than 390 penetration units, or an unworked consistency of less than 360 penetration units, by the method of test of the American Society for Testing Materials D–217–33–%."

TABLE 21.1. NLGI LUBRICATING GREASE CONSISTENCY CLASSIFICATION

Consistency number:	ASTM worked penetration at 77° F.
0	355 to 385
1	310 to 340
2	265 to 295
3	220 to 250
4	175 to 205
5	130 to 160
6	85 to 115

ASTM Method D–217–52T does not provide for tests of lubricating greases softer than those having a penetration of about 400, and some of the greases of the invention have a penetration of 400 or slightly over; but for the purposes of the invention "greases" have about 400 or less penetration.

As a specific example, using the previously quoted formulation of Example 1, pentachlorophenol (10 parts) is dissolved in Shell medium aromatic oil (79.3 parts). Next, dioctadecyldimethyl ammonium bentonite (10 parts) is stirred into the solution of pentachlorophenol in Shell medium aromatic oil. Then, methanol (0.7 part) is also stirred into the resulting slurry of dioctadecyldimethyl ammonium bentonite in the Shell medium aromatic oil solution of pentachlorophenol, which material is at this stage a relatively free flowing liquid (slurry). The material is then passed through a homogenizer (wherein it is subjected to about 2000 pounds per square inch of shear) and the resulting material obtained from the homogenizer is a grease-like gel having the properties described in connection with Example 1. The same procedure is employed in preparing each of the other formulations set forth herein, to obtain the results specified.

The grease of Example 1 is applied to poles in line (along the ground line) and found to effectively preserve the wood. In areas of rainfall of about 15 inches or more a year, this grease-like material is applied to an area on the pole extending from about 2 inches above the ground line to about 14 to 20 inches below. In arid regions, the grease-like material is applied from approximately the ground line to as much as 3 or more feet below the ground line. The instant grease-like material is also applied to the exposed tops of poles and found to be an effective preservative in this respect also. Each of the aforementioned examples of grease-like material are used in substantially the manner just described to obtain effective wood preservation and prolong the life of poles in the line.

Particularly in the case of moist wood having a moisture content of 20 to 50%, it has been found that the penetration of the compositions of Examples 1 through

10 is greatly improved by the addition thereto of an alkaline inorganic alkali metal salt in relatively small amounts. In each case, the inorganic salt is added, by thorough mixing, after the other ingredients have been processed through the homogenizer to obtain a grease-like gel. A typical formulation for this purpose is set forth in the following example:

EXAMPLE 11

	Percent
Dicetyldimethyl ammonium bentonite	7.0
Aromatic HB	78.6
Pentachlorophenol	8.7
Methanol	0.7
Sodium fluoride	5.0

ASTM penetration: 400; all other properties good.

Pole stubs of southern yellow pine placed in the soil are found to have an equilibrium moisture content at the ground line (under the test conditions) of 35 to 40% by weight of the dry wood; and it is found that these pole stubs are effectively preserved by the application of the grease-like material of Example 11. In such cases where the moisture content is high, a preferred formulation is that of Example 11 which specifies the use of a water-soluble preservative salt such as sodium fluoride in the grease-like composition. Distinctly superior penetration of the wood is obtained, as evidenced by a higher concentration of pentachlorophenol within the body of the wood, if an alkaline inorganic alkali metal salt such as sodium fluoride is used.

Correspondingly superior results in penetration of moist wood are obtained using in the procedure of Example 11 each of the following compositions:

Composition A

Sodium fluoride in an amount equal to 5% of the weight of the grease-like composition of Example 1 is admixed therewith and is found to impart superior wood penetration thereto.

Composition B

To the grease-like composition of Example 2, there is added 5% by weight of sodium carbonate, and it is found that the wood penetration in moist wood is distinctly improved.

Composition C

To the grease-like composition of Example 3, there is added 4% by weight of borax and it is found that superior wood penetration is obtained.

Composition D

Sodium fluoride in amounts equivalent to 0.5%, 1%, 2%, 5% and 10% is added to separate portions of the grease-like composition of Example 4 and the resulting compositions exhibit superior wood penetration with test pieces of southern yellow pine having a moisture content of 35 to 40%. The superior penetration is more noticeable in the case of the compositions containing 5% and 10% sodium fluoride.

Composition E

Sodium bicarbonate in amounts equal to 5% of the grease-like compositions of Examples 5 and 6 is added thereto, and the moist wood penetration of each composition is noticeably improved.

Composition F

Potassium fluoride is added in amounts equal to 5% of the grease-like compositions of Examples 7 and 8 and it is found that the moist wood penetration of both of these compositions is improved.

Composition G

Potassium carbonate is added in amounts equal to 5% of the compositions of Examples 9 and 10 and it is found that this addition of potassium carbonate improves the moist wood penetration of the composition.

EXAMPLE 12

As previously mentioned, the superior pentachlorophenol wood penetration obtained by the use of the alkaline inorganic alkali metal salt in a grease-like composition amounts to an improvement of as much as 600 or 700%. This may be demonstrated numerically. For example, pieces of untreated southern yellow pine posts were set in the ground in the manner in which a telephone pole would be placed. After several weeks during which rainfall was heavy and the wood picked up a substantial amount of moisture, these pieces were removed and treated by the application of Compositions X and Y (below). The posts were then replaced in the ground. Two months after the application of the preservative grease, the posts were again removed, and borings taken and analyses made of the pounds of pentachlorophenol per cubic foot of wood both at the "outside" which is the outer ½ inch thickness of the post and at the "inside" which is the region 1 to 2 inches from the outside surface of the post, and the results are shown in Table 1 below:

Composition X

	Percent
Dicetyldimethyl ammonium bentonite	7.5
Aromatic HB oil	81.8
Methanol	0.7
Pentachlorophenol	10.0

Composition Y

Sodium fluoride in an amount equivalent to 5% of Composition X is added thereto.

TABLE I

Post No.	Moisture Content percent	Comp.	Penetration (Pentachlorophenol content	
			Outside	Inside
1	28.5	X	0.755	0.060
2	31.5	X	0.684	0.080
3	36	X	0.785	0.113
4	31.5	X	0.852	0.176
5	31	X	0.585	0.060
6	45	Y	0.713	0.243
7	42	Y	0.792	0.343
8	41	Y	0.819	0.393
9	41	Y	0.852	0.343
10	40	Y	0.819	0.306

Comparable results are obtained using, in place of the sodium fluoride, in Composition Y sodium carbonate, borax, sodium bicarbonate, potassium carbonate and/or potassium fluoride. Comparable results are also obtained using the following composition:

Composition Z

	Percent
Dicetyldimethyl ammonium bentonite	7.9
Coal tar creosote	16.0
Sodium fluoride	12.0
Aromatic HB oil	52.2
Pentachlorophenol	14.4
Methanol	1.2

It will be understood that modifications and variations may be effected without departing from the spirit and scope of the novel concepts of the present invention.

This is a continuation-in-part of my application Serial No. 675,002, filed July 30, 1957, and issued September 15, 1959, as U.S. Patent No. 2,904,467.

As indicated herein, the mineral oil solvent content of the composition is preferably relatively substantial, i.e., about 50% to 95%; although it is apparent that, when a liquid preservative such as creosote is employed, a substantial portion of the typical aromatic petroleum oil solvent may be replaced by the "liquid" creosote, e.g. in Ex-

ample 6 herein wherein the oil component comprises 40% heavy aromatic naphtha and 44.3% coal tar creosote.

I claim as my invention:

1. A wood preservative composition comprising at least 2% and up to 50% of pentachlorophenol, 50% to 95% of a mineral oil solvent for the pentachlorophenol, a compound of bentonite and an organic-nitrogen base in an amount sufficient to impart a grease-like consistency to said composition, said compound being a compound of bentonite with an organic base of sufficient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water, and 0.5 to 20% of an alkaline inorganic alkali metal salt selected from the class consisting of fluorides, carbonates, bicarbonates and borates.

2. A wood preservative composition comprising at least 2% and up to 50% of pentachlorophenol, 50% to 95% of a mineral oil solvent for the pentachlorophenol, 0.5% to 5% of an organic polar solvent, 0.5 to 20% of an alkaline inorganic alkali metal salt selected from the class consisting of fluorides, carbonates, bicarbonates and borates, and a compound of bentonite and an organic-nitrogen base in an amount sufficient to impart a grease-like consistency to said composition, said compound being a compound of bentonite with an organic base of sufficient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water.

3. A wood preservative composition comprising at least 2% and up to 50% of pentachlorophenol, 50% to 95% of a mineral oil solvent for the pentachlorophenol, 1 to 20% sodium fluoride, and a compound of bentonite and an organic-nitrogen base in an amount sufficient to impart a grease-like consistency to said composition, said compound being a compound of bentonite with an organic base of sufficient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water.

4. A wood preservative composition comprising at least 2% and up to 50% of pentachlorophenol, 50% to 95% of a mineral oil solvent for the pentachlorophenol, 0.5% to 5% of an organic polar solvent, 1 to 20% sodium fluoride, and a compound of bentonite and an organic-nitrogen base in an amount sufficient to impart a grease-like consistency to said composition, said compound being a compound of bentonite with an organic base of sufficient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water.

5. A wood preservative composition comprising at least 2% and up to 50% of pentachlorophenol, 50% to 95% of a mineral oil solvent for the pentachlorophenol, a combination of (*a*) an inert inorganic filler, (*b*) 0.5% to 20% of an alkaline inorganic alkali metal salt selected from the class consisting of fluorides, carbonates, bicarbonates and borates and (*c*) a compound of bentonite and an organic-nitrogen base in an amount sufficient to impart a grease-like consistency to said composition, said compound being a compound of bentonite with an organic base of sufficient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water, the weight ratio of (*a*) plus (*b*):(*c*) ranging from 1:10 to 10:1.

6. A wood preservative composition comprising at least 2% and up to 50% of pentachlorophenol, 50% to 95% of a mineral oil solvent for the pentachlorophenol, 0.5% to 5% of an organic polar solvent, a combination of (*a*) an inert inorganic filler, (*b*) 0.5% to 20% of an alkaline inorganic alkali metal salt selected from the class consisting of fluorides, carbonates, bicarbonates and borates and (*c*) a compound of bentonite and an organic-nitrogen base in an amount sufficient to impart a grease-like consistency to said composition, said compound being a compound of bentonite with an organic base of sufficient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water, the weight ratio of (*a*) plus (*b*):(*c*) ranging from 1:10 to 10:1.

7. A wood preservative composition comprising at least 2% and up to 50% of pentachlorophenol, 50% to 95% of a mineral oil solvent for the pentachlorophenol, and a combination of (*a*) silica, (*b*) 0.5% to 20% of an alkaline inorganic alkali metal salt selected from the class consisting of fluorides, carbonates, bicarbonates and borates and (*c*) a compound of bentonite and an organic-nitrogen base in an amount sufficient to impart a grease-like consistency to said composition, said compound being a compound of bentonite with an organic base of sufficient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water, the weight ratio of (*a*) plus (*b*):(*c*) ranging from 1:10 to 10:1.

8. A wood preservative composition comprising at least 2% and up to 50% of pentachlorophenol, 50% to 95% of an aromatic petroleum oil, 0.5 to 20% of an alkaline inorganic alkali metal salt selected from the class consisting of fluorides, carbonates, bicarbonates and borates, and a compound of bentonite and an organic-nitrogen base in an amount sufficient to impart a grease-like consistency to said composition, said compound being a compound of bentonite with an organic base of sufficient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water.

9. A wood preservative composition comprising at least 2% and up to 50% of pentachlorophenol, 50% to 95% of an aromatic petroleum oil, 1 to 10% of sodium fluoride, and a compound of bentonite and an organic-nitrogen base in an amount sufficient to impart a grease-like consistency to said composition, said compound being a compound of bentonite with an organic base of sufficient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water.

10. A wood preservative composition comprising at least 2% and up to 30% of pentachlorophenol, 50% to 95% of an aromatic petroleum oil, 1 to 10% of sodium fluoride, 0.5% to 5% of an organic polar solvent, and a compound of bentonite and an organic-nitrogen base in an amount sufficient to impart a grease-like consistency to said composition, said compound being a compound of bentonite with an organic base of sufficient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water.

11. A wood preservative composition comprising at least 2% and up to 30% of pentachlorophenol, 0.5% to 20% of an alkaline inorganic alkali metal salt selected from the class consisting of fluorides, carbonates, bicarbonates and borates, 50% to 95% of an organic liquid carrier for the pentachlorophenol consisting essentially of creosote and an aromatic petroleum oil, and a compound of bentonite and an organic nitrogen base in an amount sufficient to impart a grease-like consistency to the composition, said compound being a compound of bentonite with an organic base of sufficient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water.

12. A wood preservative composition consisting of 5% to 30% of pentachlorophenol, 1% to 20% of sodium fluoride, 50% to 95% of an organic solvent mixture for the pentachlorophenol consisting essentially of an aromatic petroleum oil and creosote, 0.5% to 5% of methanol, and a compound of bentonite and an organic nitrogen base in an amount sufficient to impart a grease-like consistency to said composition, said compound being a compound of bentonite with an organic base of suffi-

cient alkalinity to be titratable with mineral acids, which compound is made by bringing together bentonite and such organic base in the presence of water.

13. A wood preservative composition having the following formulation:

	Percent
Dicetyldimethyl ammonium bentonite	7.9
Coal tar creosote	16.0
Sodium fluoride	12.0
Aromatic HB oil	52.2
Pentachlorophenol	14.4
Methanol	1.2

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