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COMPOSITION OF MATTER AND PROCESS
OF PREPARING THE SAME

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This invention relates to a composition of matter and a process of preparing the same and more particularly to compositions for use as antiseptics or disinfectants.

In the preparation of disinfectants containing tar acids, it is customary to employ a tar-acid oil fraction of tar. Such a fraction contains various tar acids including benzophenol, cresols and xylenols and various hydrocarbons. For disinfectant purposes, the tar-acid oil is made up in the form of an emulsion by mixing it with a soap solution.

Disinfectants of the type described have certain disadvantages. One of the most serious disadvantages is that they have a high content of benzophenol which is highly caustic and very poisonous. Another disadvantage is that due to the high benzophenol content, the germicidal effect is relatively weak.

It is well known that the germicidal activity of the homologues of phenol increases in the order of phenol, cresols, xylenols, and that their harmful action to tissues decreases in the same order. Ordinarily, the benzophenol content of tar-acid oils may be decreased by distilling the tar-acid oil up to a temperature at which the benzophenol is vaporized. In so doing, however, a large proportion of the lower boiling oils which boil in the range of the boiling point of phenol are also removed. A residue is left which has a low benzophenol content, but which is relatively difficult to emulsify. Furthermore, this procedure is expensive and wasteful.

A disinfectant of the above type free from benzophenol may also be prepared in the following manner: Tar-acid oil is treated with caustic soda solutions. The tar acids are separated from the hydrocarbon oil portion of the tar-acid oil in the form of sodium salts. These sodium salts are treated with carbon dioxide to produce free tar acids. The free tar acids are fractionally distilled to remove phenol, and the higher boiling tar acids including cresols and xylenols are returned to the aforementioned hydrocarbon oil portion or so-called neutral oil. A disinfectant is then prepared from the resulting reconstructed oil.

I have found that when the cresols or xylenols separated in the manner described, are halogenated and then returned to the neutral oil, a remarkable increase in the germicidal strength of the disinfectant is obtained, particularly when these materials are embodied in an emulsion. I have discovered that disinfectants comprising emulsions containing both a nuclear halogenated phenolic substance and an oil, such as neutral coal

tar oil, exhibit greater germicidal activity than similar disinfectants comprising emulsions containing nuclear chlorinated phenolic substances or neutral coal tar oil separately. This phenomenon may be readily illustrated by means of the following table:

	A	B	C	D
	Percent	Percent	Percent	Percent
Mixed chloroxylenols.....		10	8.44	8.44
Neutral coal tar oil.....	67.7			46.8
Glycerine.....		63		
Soap.....	31.1	20.3	16.1	16.1
Water.....	1.2	6.7	75.5	28.7
Phenol coefficient.....	1.2	3	4.6	14

The proportions of the ingredients in the compositions A, B, C and D tabulated above are given in percent by weight. The phenol coefficient referred to in the table is a comparative measure of the germicidal activity of disinfectants with respect to pure benzophenol (C₆H₅OH) taken as unity. The coefficients given were determined according to the 1921 modification of the Rideal-Walker method.

It is readily seen that in the case of the composition D which contains both chlorinated xylenols and neutral oil, the phenol coefficient is surprisingly greater than the phenol coefficient of the compositions A or C, the latter containing chloroxylenols and no neutral oil, while the composition A contains neutral oil and no chloroxylenols. The composition B shows the effect of chloroxylenols combined with glycerine instead of neutral oil.

The reason for the above phenomenon is not known, but I have found that by preparing an emulsion in which both nuclear halogenated phenolic compounds and oils, such as neutral tar oil are present, disinfectants of unusually high strength are produced. In fact, my disinfectants have a phenol coefficient considerably higher than most disinfectants on the market considering the percentage of active ingredient present.

It may be said that the hydrocarbon oil either steps up the toxicity of the halogenated phenolic compound or in some way breaks down the resistance of the microbe with which it comes into contact.

The halogenated phenolic compounds which may be used in the present invention are the chlorine, bromine, iodine, or fluorine compounds of phenols or of carbocyclic compounds having an hydroxyl group or groups directly attached to

the benzene nucleus; the halogen being likewise directly attached to a benzene nucleus.

- Such compounds are the nuclear halogenated products of benzophenol (such as ortho- or para-chlorophenols and the 2,4- and 2,4,6- trichlorophenols), isomeric cresols (such as parachloro-meta cresol, tetrachlorocresol), isomeric xylenols (such as monochloroparaxylenol, trichlorometa-xylenol), higher substituted homologues of phenol (such as butyl, amyl or hexylchlorophenol, chlorothymol, chlorocarvacrol), naphthols (such as mono-di- and tetrachloronaphthols), phenylphenols (such as ortho- and parahydroxychlorodiphenyl), polyhydroxyphenols (such as 2,4,6- trichlororesorcinol, chlorobutyl- or chlorohexylresorcinol), phenols of the structure $R-C-R'$ where R' may be a phenyl, alkyl or substituted phenyl group and C may be carbon, sulphur or a linkage of carbon atoms (such as chlorinated 2,4- dihydroxydiphenylethane, orthochloroparahydroxy diphenylsulphide) and compounds resulting from the condensation of phenols and aldehydes (such as chlorinated 0,0' dihydroxydiphenylmethane).

- One or more halogen atoms may be combined with these compounds. Mixtures of the foregoing compounds which have been halogenated or which contain halogen as part of their aryl nucleus may be used. The chlorine compounds are preferred, and of these, mixed chloroxylenols are preferably used. These compounds are used in the present invention to the extent of 2% to substantially 60%.

- The oil which is preferred is a neutral coal tar oil which is produced in large quantities as a by-product in the manufacture of tar acids and naphthalene in coal tar distilleries and which is substantially free from tar acids, and free from crystalline matter when at 20° C. or when cooled below substantially 20° C., preferably at or between -10° C. and +5° C. Other oils, such as petroleum or its fractions, water gas tar, shale tar, may be used in place of or combined with neutral coal tar oil.

- In the preparation of emulsions, the emulsifying or dispersing agents may be any of those commonly employed such as rosin soap, a castor oil soap, cocoanut oil soap, animal fat soaps, or mixtures of these soaps or meta silicates mixed with soap. Such agents may, if desired, be mixed with other dispersing or stabilizing agents, such as gelatin, casein, saponins and the like.

- By way of example, a disinfectant having a phenol coefficient of 11 may be prepared as follows:

- A xyleneol fraction, 50% of which distills off up to 225° C. is chlorinated in the usual manner employed in obtaining the monochlor compound. An emulsion is prepared containing 10% of chloroxylenol, 63% of neutral oil free from tar acids and 27% of a rosin soap solution in water. It is noted that a disinfectant containing 10% xylenols in place of 10% chloroxylenols and similar proportions of the other ingredients, has a coefficient of only between 3 and 4.

- In preparing a disinfectant for commercial purposes and on a large scale, the following procedure may be used:

- A mixture of 20 parts by weight of rosin and 60 parts by weight of oil such as neutral coal tar oil having a boiling range between substantially 160° C. and 250° C. are placed in a vat and heated to about 70° C. The rosin melts and is thoroughly mixed with the oil. To this mixture are added about 10 parts by weight of chloroxylenol

and 6 parts by weight of a 50% solution of sodium hydroxide in water. Additional water is added to make up 100 parts. The resulting product has a phenol coefficient of about 14.

Expressing this differently, about 1 cubic centimeter of this product when added to about 280 cubic centimeters of water gives an emulsion equivalent to a 5% solution of benzophenol. An emulsion containing these proportions is very satisfactory for disinfecting inanimate objects. An emulsion containing about 1 cubic centimeter of the above product in about 1400 cubic centimeters of water is satisfactory for disinfecting the hands or other skin portions of the human body.

Products now on the market, including disinfectants and insecticides, may be rendered more germicidal by the addition of either halogenated phenolic compounds or oils, or both, depending on whether they contain one or the other or neither of these substances. For instance, a product which is now being sold contains chlorinated xylenols, chlorinated cresols, soap and water. By the addition of a hydrocarbon oil such as neutral coal tar oil, to this product, the phenol coefficient thereof may be stepped up from about 3 to a coefficient greater than 10.

Another product which is generally sold as a disinfectant is one which contains a coal tar hydrocarbon oil, tar acids to the extent of 15 to 30% by weight of the said oil, soap, and water. By mixing with this product a halogenated phenolic substance such as chlorinated xyleneol, the phenol coefficient may be increased considerably.

In the commercial distribution of the product of the present invention, mixtures of halogenated phenolic compounds such as chloroxylenols, and oil such as neutral oil, may be prepared in any desired proportion and sold as such, to be later emulsified with soap solutions or other dispersing agents. Mixtures of tar acid oil and halogenated phenolic compounds may also be prepared for similar distribution.

The higher tar phenols are of small commercial value and therefore relatively inexpensive. The process of chlorination is simple and likewise inexpensive. By combining the inexpensive chlorinated products with the by-product neutral oil, for instance, a disinfectant substance is produced which is not only inexpensive but far exceeds in potency the ordinary tar acid disinfectant containing the same percentages of active ingredients.

It is understood that the composition of neutral coal tar oil varies and that it contains among others in varying amounts, the following hydrocarbon oils: cumene, mesitylene, hemimellitene, isodurene, methyl naphthalene. Its distillation range has been described as 5% off at 160° C. and dry at 300° C. It is further understood that any hydrocarbon oils may be used that are adapted to function in a manner similar to the manner in which the hydrocarbon oils mentioned above function with respect to increasing the phenol coefficient of an emulsion of a chlorophenolic material.

The term dispersion, in the appending claims, denotes a mixture of all of the ingredients mentioned therein, either as a suspension of the oily material in the water or of the water in the oily material. It is intended that this term shall include cases in which the dispersion of all of the ingredients forms, insofar as it is possible to determine definitely, a solution or an emulsion.

I claim as my invention:

1. A disinfectant consisting of a dispersion containing a dispersing agent, water, chlorophenolic material to the extent of 2% to substantially 60%, and neutral tar oil to the extent of greater than 10% and up to substantially 63%. 80
2. A disinfectant consisting of a dispersion containing a dispersing agent, water, chloroxylenol material to the extent of 2 to substantially 60%, and neutral tar oil to the extent of greater than 10% and up to substantially 63%. 85
3. A disinfectant consisting of a dispersion containing substantially 27% to 44% soap solution, 2% to substantially 60% chloroxylenols, and greater than 10% neutral tar oil. 90
4. A disinfectant consisting of a dispersion containing a dispersing agent, water, chlorophenolic material to the extent of 2% to substantially 60%, and neutral tar oil to the extent of greater than 10% and up to substantially 63%, the said oil being substantially free from tar acids and free from crystalline matter at 20° C. or below. 95
5. A disinfectant consisting of a dispersion containing substantially 10% chloroxylenol, substantially 60% neutral tar oil, and substantially 30% of an aqueous soap solution. 100
6. A disinfectant consisting of a dispersion containing a dispersing agent, water, chlorophenolic material to the extent of 2% to substantially 60%; and substantially 10% up to substantially 63% of hydrocarbon oil selected from at least one of a group consisting of neutral coal tar oil, hydrocarbon oils of neutral coal tar oil, petroleum, its fractions, water gas tar, and shale tar. 80
7. A disinfectant consisting of a dispersion containing a dispersing agent, water, chlorophenolic material to the extent of 2% to substantially 60%; and greater than 10% and up to substantially 63% of neutral coal tar oil containing 15% to 30% tar acids by weight of the said oil. 85
8. A disinfectant consisting of a dispersion containing a dispersing agent, water, chlorophenolic material to the extent of 2% to substantially 60%, and hydrocarbon oil containing tar acids, the said hydrocarbon oil being present in the dispersion to the extent of from substantially 10% up to substantially 63%, and said hydrocarbon oil being at least one of a group consisting of neutral coal tar oil, hydrocarbon oils of neutral coal tar oil, petroleum, its fractions, water gas tar, and shale tar. 90

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