

PATENT SPECIFICATION

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(54) NOVEL ANTIBACTERIAL COMPOSITIONS

(71) We, AMERICAN HOME PRO-
 DUCTS CORPORATION, a Corporation
 organised and existing under the laws of the
 State of Delaware, United States of America,
 of 685 Third Avenue, New York 10017, New
 York, United States of America, do hereby
 declare the invention for which we pray that
 a patent may be granted to us and the method
 by which it is to be performed, to be par-
 ticularly described in and by the following
 statement:—

This invention relates to novel toilet bowl
 cleaner compositions. These compositions
 possess anti-microbial properties at the
 extremely low dilutions which are normally
 encountered with a product of this nature.

Compositions which automatically dispense
 cleaning agents and cleaning adjuncts into
 toilet bowls have been in commercial use for
 many years. However, the inhibition of the
 growth or multiplication of microbiological
 organisms in products of the above nature
 has been difficult to accomplish. This diffi-
 culty is due to the fact that most antimicrobial
 agents are ineffective at the extreme dilutions
 that automatic bowl cleaners are used.

Recently, a new antimicrobial agent,
 namely, 5 - chloro - 2 - (2,4 - dichloro-
 phenoxy)phenol has been disclosed in U.S.
 Patent No. 3,506,720. The assignee of this
 patent (Ciba-Geigy) has published data
 (Irgasan DP-300, Publication DC-25, Irgasan
 is a Registered Trade Mark) which indicates
 that the minimum inhibitory concentration of
 5 - chloro - 2 - (2,4 - dichlorophenoxy)-
 phenol required for specific micro-organisms
 is 1 ppm for *S. aureus* and *P. mirabilis* and
 3 ppm for *E. coli*.

In accordance with this invention it has
 now been found that the use of 5 - chloro -
 2 - (2,4 - dichlorophenoxy) - phenol as an
 antimicrobial with isopropanol, an alkoxy-
 lated primary fatty alcohol and, optionally, a linear
 alkyl aryl sulfonate salt, optionally combined
 with known dyes and/or perfumes produces
 a cleaning formulation which exhibits

bacteriostatic properties against *S. aureus*, *p.*
mirabilis and *E. coli* at levels as low as 0.2
 per million of the antimicrobial. By the term
 "primary fatty alcohol" is meant a straight
 chained primary alcohol derived from fats and
 oils or a synthetic C₈—C₂₂ normal primary
 alcohol.

Our copending U.K. Patent Application
 No. 1549/76 (Serial No. 1446070), which is
 a divisional of the present application dis-
 closes solid compositions possessing anti-
 microbial properties.

Therefore, this invention provides an
 aqueous antibacterial composition which com-
 prises 10 to 20% by weight of isopropanol;
 0.5 to 6% by weight of 5 - chloro - 2 - (2,4 -
 dichlorophenoxy)phenol; 0.1 to 20% by
 weight of an alkoxyated primary fatty alcohol;
 and 0.5 to 20% by weight of a linear alkyl
 aryl sulphonate salt. The aqueous antibacterial
 composition may additionally comprise 0 to
 2% by weight of sodium hydroxide. One
 aqueous antibacterial composition of this
 invention may consist substantially of the
 above mentioned ingredients and water. The
 compositions may also contain a dye and/or
 a perfume.

Thus an antibacterial liquid composition of
 this invention may consist of:

Ingredient	% By Weight	
Isopropanol	10—20	
5 - chloro - 2 - (2,3 - di- chlorophenoxy)phenol	0.5—6	
Alkoxyated primary fatty alcohol	0.1—20	80
Linear alkyl aryl sulphon- ate salt	0.5—20	
Sodium hydroxide	0—2	
Water, dye, perfume	Sufficient to make up to 100%	85

A preferred formula for an effective liquid
 cleaning and bacteriostatic composition is as
 follows:—

	Ingredient	% By Weight
	Isopropanol	14—16
	5 - chloro - 2 - (2,4 - di-chlorophenoxy)phenol	1.1—1.6
5	Alkoxyated primary fatty alcohol	4—17
	Linear alkyl aryl sulphonate salt	0.5—10
10	Water, Dye, Perfume	Sufficient to make up to 100%

For example isopropanol may form about 15% by weight of the composition and 5 - chloro - 2 - (2,4 - dichlorophenoxy)phenol may form about 1.5% by weight of the composition.

Preferred examples of alkoxyated primary fatty alcohols that are useful in this invention are those wherein the alkyl chain length is primarily C_{12} to C_{18} ; for example, a mixture containing 50% of the ethylene oxide adduct and 10% of the propylene oxide adduct of a primary fatty alcohol whose alkyl chain contains 12 to 15 carbon atoms, the remaining 40% being primary fatty alcohol. Preferred examples of the linear alkyl aryl sulphonate salts that are useful in this invention are those wherein the alkyl chain length is C_1 to C_{15} ; for example, sodium xylene sulphonate or triethanolaminedodecylbenzenesulphonate.

This invention also includes a method for preventing the growth or multiplication of microbiological organisms in toilet bowls which comprises adding a composition as hereinbefore described to a toilet bowl to prevent such growth.

In addition to the cleaning and bacteriostatic properties that the novel formulations of this invention possess, they also have the ability to reduce the surface tension of water.

As will be illustrated in the following examples, the liquid compositions of this invention have the ability to exhibit bacteriostatic properties at use levels as low as 0.2 parts per million of the antimicrobial. The examples will also indicate the antimicrobial agents known in the prior art are either ineffective or are not readily or efficiently compounded or solubilized.

The following Examples 1, 2 and 7 illustrate the above described invention. Examples 3, 4, 5 and 6 are comparative examples. The bacteria employed as the test organisms are representative of both gram negative and gram positive bacteria. The test procedure employed is the Agar Plate Test and the Agar Cup Plate Test as described in U.S.D.A. circular No. 198, 1931. The results are reported as zones of inhibition and measured in millimeters.

EXAMPLE 1

Ingredient	% By Weight
Isopropanol (99%)	15.00
5 - chloro - 2 - (2,4 - di-chlorophenoxy)phenol (97% minimum activity)	1.50
50% ethylene oxide } adduct	12.00
10% propylene oxide } of a primary fatty alcohol whose linear carbon chain length is C_{12} — C_{15} , the remaining 40% being primary fatty alcohol	
Sodium Xylene Sulphonate (40%)	2.50
Water, Dye, Perfume	Sufficient to make up to 100%

Average Zone of Inhibition (mm) Dilution 1:23,000

	S. aureus	E. coli	P. mirabilis
Agar Cup Plate Test	10	5	3
Agar Plate Test	5	2	1

EXAMPLE 2

Ingredient	% By Weight
Isopropanol (99%)	15.00
5 - chloro - 2 - (2,4 - di-chlorophenoxy)phenol (97% minimum activity)	1.50
Triethanolaminedodecylbenzenesulphonate (40%)	11.25
50% ethylene oxide } adduct	
10% propylene oxide } of a primary fatty alcohol whose linear carbon chain length is C_{12} — C_{15} , the remaining 40% being primary fatty alcohol	4.50
Water, Dye, Perfume	Sufficient to make up to 100%

Average Zone of Inhibition (mm) Dilution 1:23,000

	S. aureus	E. coli	P. mirabilis
Agar Cup Plate Test	7	15	2.5

EXAMPLE 3

Ingredient	% By Weight
Isopropanol (99%)	4.50
n-Alkyl (60% C ₁₄ , 30% C ₁₆ , 5% C ₁₂ and 5% C ₁₈) Dimethyl Benzyl Ammonium Chloride	5.00
n-Alkyl (68% C ₁₂ , 32% C ₁₄) Dimethyl Ethylbenzyl Ammonium Chloride	5.00
50% ethylene oxide } adduct	4.00
10% propylene oxide }	
of a primary fatty alcohol whose linear carbon chain length is C ₁₂ -C ₁₅ ; the remaining 40% being primary fatty alcohol	
Water, Dye, Perfume	Sufficient to make up to 100%
Average Zone of Inhibition (mm) Dilution	
	1:23,000
Agar Cup Plate Test	S. aureus 2.5 E. coli 0

25 The above is an example of the use of another antimicrobial agent employed at a much higher level than those in the previous examples which was ineffective against E. coli.

EXAMPLE 4

Ingredient	% By Weight
4',5 Dibromosalicylanilide and 3,4',5, Tribromosalicylanilide (1:1 mixture)	6.00
Polyethylene Glycol (molecular weight about 200)	50.00
Octyl phenoxy poly(ethyleneoxy)ethanol	30.00
Water	Sufficient to make up to 100%
Average Zone of Inhibition (mm) Dilution	
	1:20,000
Agar Cup Plate Test	S. aureus 16 E. coli 11

45 The above is an example of the use of a different antimicrobial agent which requires high levels of solubilizers and which was used at higher levels itself to achieve bacteriological activity.

EXAMPLE 5

Ingredient	% By Weight
3,4',5 Tribromosalicylanilide	6.00
Polyethylene Glycol (molecular weight about 200)	60.00
Octyl phenoxy poly(ethyleneoxy)ethanol	30.00
Water	4.00

Average Zone of Inhibition (mm) Dilution
1:20,000

Agar Cup Plate Test	S. aureus 10 E. coli 4 (Partial)	60
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This example illustrates another antimicrobial agent which requires high levels of solubilizers and which results in only a partial zone of inhibition at the high level employed.

EXAMPLE 6

Ingredient	% By Weight
Alkyl pyridinium 5-chloro-2-mercaptobenzo-thiazole (96%)	12.00
N-methyl-2-pyrrolidone	60.00
Octyl phenoxy poly(ethyleneoxy)ethanol	10.00
Water	18.00

Average Zone of Inhibition (mm) Dilution
1:20,000

Agar Cup Plate Test	S. aureus 7 E. coli 0	75
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This example illustrates yet another antimicrobial agent which though used at a higher level does not result in a zone of inhibition on E. coli.

EXAMPLE 7

This Example illustrates the use of 5-chloro-2-(2,4-dichlorophenoxy)phenol in the following liquid formulation where it is present at 0.50% by weight in a use dilution of 1:23,000 and 1:40,000.

Ingredients		
Isopropanol (99%)	15.00	90
5-chloro-2-(2,4-dichlorophenoxy)phenol (97% minimum activity)	0.50	
50% ethylene oxide } adduct	12.00	95
10% propylene oxide }		
of a primary fatty alcohol whose linear carbon chain length is C ₁₂ -C ₁₅ ; the remaining 40% being primary fatty alcohol		100
Water	67.75	
Sodium Xylene Sulphonate (40%)	2.50	
Dye	1.00	105
Perfume	1.25	

Average Zone of Inhibition (mm)

	Agar Cup Plate Test (Dilution 1:23,000)	S. aureus	E. coli	P. mirabilis
		6	2.5	2
5	Agar Cup Plate Test (Dilution 1:40,000)	4	1.5	0

EXAMPLE 8

The following data represents the ability of the preferred compositions of this invention to help retard stain build-up on a ceramic surface immersed in a solution containing an iron salt. Results are reported as units of stain pickup on white ceramic tiles. Less than 1 unit difference is visible to the naked eye.

	Average Units Iron Stain Pickup	Surface Tension Dynes/CM
Composition (Example 1)	4.1	41.4
Water	5.8	72

WHAT WE CLAIM IS:—

1. An aqueous antibacterial composition which comprises 10 to 20% by weight of isopropanol; 0.5 to 6% by weight of 5-chloro - 2 - (2,4 - dichlorophenoxy)phenol; 0.1 to 20% by weight of an alkoxyated primary fatty alcohol; and 0.5 to 20% by weight of a linear alkyl aryl sulphonate salt.

2. A composition as claimed in Claim 1 which also comprises up to 2% by weight of sodium hydroxide.

3. A composition as claimed in Claim 1 or Claim 2 which also comprises a dye and/or a perfume.

4. A composition as claimed in Claim 1 which consists substantially of isopropanol; 5-chloro - 2 - (2,4 - dichlorophenoxy)phenol; an alkoxyated primary fatty alcohol; a linear alkyl aryl sulphonate salt; water; and 0 to 2% by weight of sodium hydroxide.

5. An antibacterial liquid composition which consists of:

Ingredient	% By Weight
Isopropanol	10—20
5 - chloro - 2 - (2,4 - dichlorophenoxy)phenol	0.5—6
Alkoxyated primary fatty alcohol	0.1—20
Linear alkyl aryl sulphonate salt	0.5—20
Sodium hydroxide	0—2
Water, dye, perfume	Sufficient to make up to 100%

6. An antibacterial composition as claimed in Claim 5 which consists of 14 to 16% by weight of isopropanol; 1.1 to 1.6% by weight of 5-chloro - 2 - (2,4 - dichlorophenoxy)phenol; 4 to 17% by weight of an alkoxyated primary fatty alcohol; 0.5 to 10% by

weight of a linear alkyl aryl sulphonate salt, water, a dye and a perfume.

7. A composition as claimed in any one of Claims 1 to 4 in which the alkyl chain in the linear alkyl aryl sulphonate salt contains 1 to 15 carbon atoms.

8. A composition as claimed in Claim 5 or Claim 6 in which the alkyl chain in the linear alkyl aryl sulphonate contains 1 to 15 carbon atoms.

9. A composition as claimed in any one of Claims 1 to 4 and 7 in which the alkyl chain in the alkoxyated primary fatty alcohol contains 12 to 18 carbon atoms.

10. A composition as claimed in any one of Claims 5, 6 and 8 in which the alkyl chain in the alkoxyated primary fatty alcohol contains 12 to 18 carbon atoms.

11. A composition as claimed in any one of Claims 1 to 4, 7 and 9 which contains about 15% of isopropanol.

12. A composition as claimed in any one of Claims 5, 6, 8 and 10 which contains about 15% of isopropanol.

13. A composition as claimed in any one of Claims 1 to 4, 7, 9 and 11 which contains about 1.5% by weight of 5-chloro - 2 - (2,4 - dichlorophenoxy)phenol.

14. A composition as claimed in any one of Claims 5, 6, 8, 10 and 12 which contains about 1.5% by weight of 5-chloro - 2 - (2,4 - dichlorophenoxy)phenol.

15. A composition as claimed in any one of Claims 1 to 4, 7, 9, 11 and 13 in which the linear alkyl aryl sulphonate salt is sodium xylene sulphonate or triethanolaminedodecylbenzenesulphonate.

16. A composition as claimed in any one of Claims 5, 6, 8, 10, 12 and 14 in which the linear alkyl aryl sulphonate salt is sodium xylene sulphonate or triethanolaminedodecylbenzenesulphonate.

17. A composition as claimed in any one of Claims 1 to 4, 7, 9, 11, 13 and 15 in which the alkoxyated primary fatty alcohol is a mixture containing 50% of the ethylene oxide adduct and 10% of the propylene oxide adduct of a primary fatty alcohol whose alkyl chain contains 12 to 15 carbon atoms, the remaining 40% being primary fatty alcohol.

18. A composition as claimed in any one of Claims 5, 6, 8, 10, 12, 14 and 16 in which the alkoxyated primary fatty alcohol is a mixture containing 50% of the ethylene oxide adduct and 10% of the propylene oxide adduct of a primary fatty alcohol whose alkyl



Average Zone of Inhibition (mm)

	Agar Cup Plate Test (Dilution 1:23,000)	S. aureus	E. coli	P. mirabilis
		6	2.5	2
5	Agar Cup Plate Test (Dilution 1:40,000)	4	1.5	0

EXAMPLE 8

The following data represents the ability of the preferred compositions of this invention to help retard stain build-up on a ceramic surface immersed in a solution containing an iron salt. Results are reported as units of stain pickup on white ceramic tiles. Less than 1 unit difference is visible to the naked eye.

	Average Units Iron Stain Pickup	Surface Tension Dynes/CM
15 Composition (Example 1)	4.1	41.4
Water	5.8	72

20 WHAT WE CLAIM IS:—

1. An aqueous antibacterial composition which comprises 10 to 20% by weight of isopropanol; 0.5 to 6% by weight of 5-chloro - 2 - (2,4 - dichlorophenoxy)phenol; 25 0.1 to 20% by weight of an alkoxyated primary fatty alcohol; and 0.5 to 20% by weight of a linear alkyl aryl sulphonate salt.

2. A composition as claimed in Claim 1 which also comprises up to 2% by weight of sodium hydroxide.

3. A composition as claimed in Claim 1 or Claim 2 which also comprises a dye and/or a perfume.

4. A composition as claimed in Claim 1 which consists substantially of isopropanol; 5-chloro - 2 - (2,4 - dichlorophenoxy)phenol; an alkoxyated primary fatty alcohol; a linear alkyl aryl sulphonate salt; water; and 0 to 2% by weight of sodium hydroxide.

40 5. An antibacterial liquid composition which consists of:

Ingredient	% By Weight
Isopropanol	10—20
5-chloro - 2 - (2,4 - di- 45 chlorophenoxy)phenol	0.5—6
Alkoxyated primary fatty alcohol	0.1—20
Linear alkyl aryl sulphon- ate salt	0.5—20
50 Sodium hydroxide	0—2
Water, dye, perfume	Sufficient to make up to 100%

55 6. An antibacterial composition as claimed in Claim 5 which consists of 14 to 16% by weight of isopropanol; 1.1 to 1.6% by weight of 5-chloro - 2 - (2,4 - dichlorophenoxy)phenol; 4 to 17% by weight of an alkoxyated primary fatty alcohol; 0.5 to 10% by

weight of a linear alkyl aryl sulphonate salt, water, a dye and a perfume.

7. A composition as claimed in any one of Claims 1 to 4 in which the alkyl chain in the linear alkyl aryl sulphonate salt contains 1 to 15 carbon atoms.

8. A composition as claimed in Claim 5 or Claim 6 in which the alkyl chain in the linear alkyl aryl sulphonate contains 1 to 15 carbon atoms.

9. A composition as claimed in any one of Claims 1 to 4 and 7 in which the alkyl chain in the alkoxyated primary fatty alcohol contains 12 to 18 carbon atoms.

10. A composition as claimed in any one of Claims 5, 6 and 8 in which the alkyl chain in the alkoxyated primary fatty alcohol contains 12 to 18 carbon atoms.

11. A composition as claimed in any one of Claims 1 to 4, 7 and 9 which contains about 15% of isopropanol.

12. A composition as claimed in any one of Claims 5, 6, 8 and 10 which contains about 15% of isopropanol.

13. A composition as claimed in any one of Claims 1 to 4, 7, 9 and 11 which contains about 1.5% by weight of 5-chloro - 2 - (2,4 - dichlorophenoxy)phenol.

14. A composition as claimed in any one of Claims 5, 6, 8, 10 and 12 which contains about 1.5% by weight of 5-chloro - 2 - (2,4 - dichlorophenoxy)phenol.

15. A composition as claimed in any one of Claims 1 to 4, 7, 9, 11 and 13 in which the linear alkyl aryl sulphonate salt is sodium xylene sulphonate or triethanolaminedodecylbenzenesulphonate.

16. A composition as claimed in any one of Claims 5, 6, 8, 10, 12 and 14 in which the linear alkyl aryl sulphonate salt is sodium xylene sulphonate or triethanolaminedodecylbenzenesulphonate.

17. A composition as claimed in any one of Claims 1 to 4, 7, 9, 11, 13 and 15 in which the alkoxyated primary fatty alcohol is a mixture containing 50% of the ethylene oxide adduct and 10% of the propylene oxide adduct of a primary fatty alcohol whose alkyl chain contains 12 to 15 carbon atoms, the remaining 40% being primary fatty alcohol.

18. A composition as claimed in any one of Claims 5, 6, 8, 10, 12, 14 and 16 in which the alkoxyated primary fatty alcohol is a mixture containing 50% of the ethylene oxide adduct and 10% of the propylene oxide adduct of a primary fatty alcohol whose alkyl



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chain contains 12 to 15 carbon atoms, the remaining 40% being primary fatty alcohol.

5 19. A composition as claimed in Claim 5 substantially as hereinbefore described with reference to any one of Examples 1, 2 and 7.

10 20. A method for preventing the growth or multiplication of microbiological organisms in toilet bowls which comprises adding a liquid antibacterial composition as claimed in any one of Claims 1 to 4, 7, 9, 11, 13, 15 and 17 to a toilet bowl to prevent such growth.

21. A method for preventing the growth or multiplication of microbiological organisms in toilet bowls which comprises adding a liquid antibacterial composition as claimed in any one of Claims 5, 6, 8, 10, 12, 14, 16 and 18 to a toilet bowl to prevent such growth. 15

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