

PATENT SPECIFICATION

NO DRAWINGS

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825.875



Date of filing Complete Specification: June 14, 1957.

Application Date: June 27, 1956.

No. 19938/56.

Complete Specification Published: Dec. 23, 1959.

Index at acceptance:—Classes 2(3), C1E3K(3:6), C1E7K(2:3:6); 81(1), E1C1A, E1C3A(3:4),
E1C4A(1:2:3:4), E1C(13:16:17); and 111, B3(C2:F1:F2).

International Classification:—A01n. C05d, f. C07c.

COMPLETE SPECIFICATION

Substituted Phenoxy-Propionic Acid Esters and Compositions containing them

5 We, BOOTS PURE DRUG COMPANY LIMITED, a British Company, of Station Street, Nottingham, 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 particularly described in and by the following statement:—

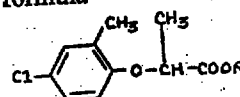
10 The invention relates to new phenoxypropionic acid derivatives which have valuable herbicidal properties.

15 It has been known for some years that many members of the class of compounds comprising phenoxyalkanoic acids and their derivatives exhibit growth control properties when plants are treated with them and that in some cases the morphological response is selective in character so that these compounds can form the active ingredient of selective herbicidal compositions for destroying or controlling the growth of susceptible varieties of weeds in crops which are not susceptible. Certain compounds of this class including 2:4-dichlorophenoxyacetic acid and 2-methyl-4-chlorophenoxyacetic acid have been extensively used in herbicidal compositions for use as selective weed killers in grain crops and grassland. Such compounds may for example be produced by the processes of Specifications Nos. 573,479 and 573,510.

30 It has long been recognised that certain weeds including in particular Cleavers (Galium species such as Galium Aparine) and chickweed (Stellaria media) are not susceptible to those herbicides of the phenoxyalkanoic class which have found widespread use, and the use of such herbicides has led to increasing infestation of treated land with cleavers and chickweed, such weeds accordingly representing an increasingly intractable problem in modern agriculture.

40 The invention consists in the compounds of
[Price 3s. 6d.]

the general formula



45 in which R is an alkyl radical having at least 3 carbon atoms, a phenyl substituted alkyl radical, an alkoxyalkyl radical or an alkoxy-alkoxyalkyl radical and in compositions thereof which may be used for plant growth regulating purposes, and which comprise a compound of the above general formula and a carrier or diluent.

55 The compounds of the present invention are distinguished from derivatives of other phenoxyalkanoic acids by the possession of activity against cleavers and chickweed. This property is surprising in view of the known lack of activity against cleavers and chickweed shown by the corresponding substituted phenoxyacetic acid derivatives and has not previously been described in any other derivatives of phenoxypropionic acid. The compounds of the present invention, which are esters, have a particularly low volatility and may safely be used in crops without danger of drifting to adjacent crops of susceptible character.

65 The compounds of the invention may be prepared by the condensation of 4-chloro-2-methylphenol with an ester of an alpha-halo-propionic acid, having the formula



when R is as specified above and X is a halogen atom. Alternatively they may be prepared by esterification of alpha-(4-chloro-2-methylphenoxy)-propionic acid with an alcohol of the formula $\text{R}-\text{OH}$ where R is as specified above.

75 The compositions of the invention com-

prise the active ingredient in combination with an emulsifying agent, and if desired, an organic solvent which may be a water miscible solvent such as acetone or a water immiscible solvent such as xylene. The compositions according to the invention may also contain a wetting agent. These compositions, which are commonly referred to as "miscible oils" may be supplied to the user with instructions to dilute them with water, whereupon they spontaneously form emulsions and in this form the active ingredient may be applied to cleavers and chickweed in cereal crops to eradicate the cleavers and chickweed without harming the cereal plants. Such miscible oils may also be diluted with other solvents such as paraffin. Alternatively the user may be supplied with a concentrated emulsion obtained from a miscible oil by the addition of approximately an equal volume of water. Such concentrated emulsions are diluted with an appropriate amount of water before application to plants. The compositions of the invention therefore include the aforementioned miscible oils and the emulsions derived therefrom. The compositions of the invention also include dispersible powders which comprise the active ingredient absorbed on a solid inert diluent, for example kaolin, and a dispersing agent, with or without the addition of a wetting agent, and herbicidal dusts in which the carrier or diluent is a powdered solid, for example kaolin.

The following non - limitative examples illustrate the invention.

EXAMPLE 1.

In the preparation of *n*-butyl alpha-(4-chloro - 2 - methylphenoxy) - propionate a mixture of 21.5 grams of alpha - (4 - chloro - 2 - methylphenoxy) - propionic acid, 22.2 grams of *n*-butanol, 0.3 c.c. of concentrated sulphuric acid and 30 c.c. of ethylene dichloride is heated under reflux for 6 hours. The reaction product is cooled, washed with 25 c.c. of 2*N* sodium hydroxide followed by two portions of 50 c.c. of water, dried over anhydrous magnesium sulphate and subjected to fractional distillation under reduced pressure. That fraction is collected which has a boiling point of 147—150° C. under a pressure of 3 m.m. of mercury and is redistilled. There is thus obtained *n* - butyl alpha-(4-chloro - 2 - methylphenoxy) - propionate in the form of an oil which has a boiling point of 138° C.—140° C. under a pressure of 2 m.m. of mercury.

In exactly similar manner using *n* - amyl alcohol and 2-ethylhexanol respectively in place of *n*-butanol there are prepared the following compounds:—

n-Amyl alpha - (4 - chloro - 2 - methylphenoxy)-propionate, b.p. 139—140° C./1.5 m.m. 2-ethylhexyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, b.p. 163—165° C./2 m.m. (Found: C, 66.6; H, 8.3.

$C_{18}H_{27}O_3Cl$ requires C, 66.2; H, 8.3%).

EXAMPLE 2.

In the preparation of 2-(2-*n*-butoxyethoxy)-ethyl alpha - (4 - chloro - 2 - methylphenoxy)-propionate, a mixture of 21.5 grams of alpha-(4 - chloro - 2 - methylphenoxy) - propionic acid and 17.8 grams of diethylene glycol monobutyl ether is heated at 180° C. until the distillation of water ceases. The residue is cooled, diluted by the addition of 30 c.c. of ether and washed with two portions of 25 c.c. of 20% triethanolamine followed by three portions of 25 c.c. of water. The organic layer is dried over anhydrous sodium sulphate and the ether removed by distillation. There is thus obtained 2 - (2 - *n* - butoxyethoxy)-ethyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate in the form of an oil, d_4^{20} 1.107.

In exactly similar manner using the appropriate alcohol in place of diethylene glycol monobutyl ether there are prepared the following compounds.

Benzyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, b.p. 196—8° C./3.5 m.m. (Found: C, 66.9; H, 5.6. $C_{17}H_{17}O_3Cl$ requires C, 67.0; H, 5.6%).

2 - Butoxyethyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, b.p. 188° C./3 m.m. (Found: C, 61.0; H, 7.5. $C_{16}H_{23}O_3Cl$ requires C, 61.1; H, 7.3%).

3:5:5-Trimethylhexyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, b.p. 172—176° C./1 m.m. (Found: C, 67.0; H, 8.6. $C_{19}H_{29}O_3Cl$ requires C, 67.0; H, 8.5%).

EXAMPLE 3.

In the preparation of benzyl alpha - (4-chloro - 2 - methylphenoxy) - propionate a mixture of 8 grams of 4-chloro-2-methylphenol, 15.0 grams of benzyl alpha-bromopropionate and 7.7 grams of potassium carbonate in 40 c.c. of acetone is heated under reflux for 4 hours. The reaction product is cooled, filtered and the filtrate subjected to fractional distillation under reduced pressure. That fraction is collected which has a boiling point of 188° C. under a pressure of 2 mm. mercury. There is thus obtained benzyl alpha - (4 - chloro - 2 - methylphenoxy)-propionate in the form of an oil which has a boiling point of 188° C. under a pressure of 2 mm. mercury and which is identical with the ester described in Example 2.

In exactly similar manner using 15.6 grams of 2-butoxyethyl alpha-bromopropionate in place of 15 grams of benzyl alpha-bromopropionate there is obtained 2 - butoxyethyl alpha - (4 - chloro - 2 - methylphenoxy)-propionate in the form of an oil which has a boiling point of 180—182° C./2 mm., and which is identical to the ester described in Example 2.

Benzyl alpha - bromopropionate which is employed in the preparation of benzyl alpha-(4 - chloro - 2 - methylphenoxy) - propionate

may be prepared in the following manner. A mixture of 176 grams of benzyl alcohol and 50 grams of alpha - bromopropionic acid is saturated with hydrogen chloride at 0° C. and the resulting mixture is allowed to stand overnight at room temperature. It is then washed with two 1 litre portions of water, 1 litre of 5N sodium bicarbonate solution and again with 1 litre of water. After drying over anhydrous sodium sulphate the washed reaction product is subjected to fractional distillation under reduced pressure and that fraction is collected which has a boiling point of 110° C. under a pressure of 1 mm. of mercury. There is thus obtained benzyl alpha-bromopropionate in the form of an oil which has a boiling point of 110° C./1 mm.

2 - Butoxyethyl alpha - bromopropionate which is employed in the preparation of 2-butoxyethyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate may be prepared in exactly similar manner to that described above for benzyl alpha-bromopropionate employing 193 grams of 2-butoxyethanol in place of 176 grams of benzyl alcohol. There is thus obtained 2-butoxyethyl alpha-bromopropionate in the form of an oil which has a boiling point of 94° C./1 mm.

EXAMPLE 4.

In the preparation of a composition which gives an emulsion on dilution with water 4.9 grams of 2-ethylhexyl alpha - (4 - chloro - 2-methylphenoxy) - propionate is dissolved in 10 c.c. of a solvent comprising 9 c.c. of acetone and 1 c.c. of Ethylan C.P. (a proprietary emulsifying agent which is a polyethylene oxide condensate of an octylphenol).

EXAMPLE 5.

In the preparation of a composition which gives an emulsion on dilution with water 4.9 grams of 2 - ethylhexyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate is dissolved in 10 c.c. of a solvent comprising 9 c.c. of xylene and 1 c.c. of Ethylan S.E. (a proprietary emulsifying agent which is a mixture of lauric diethanolamide and a polyethylene oxide condensate of an octylphenol).

Similar compositions to those described in Examples 4 and 5 may be prepared in which the active ingredient consists of 4.0 grams of *n* - butyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, 4.25 grams of *n*-amyl alpha - (4 - chloro - 2 - methylphenoxy)-propionate, 5.3 grams of 2 - (2 - *n* - butoxyethoxy) - ethyl alpha - (4 - chloro - 2-methylphenoxy) - propionate, 4.5 grams of benzyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, 4.7 grams of 2 - *n*-butoxyethyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate or 5.1 grams of 3:5:5-trimethylhexyl alpha - (4 - chloro - 2-methylphenoxy) - propionate.

EXAMPLE 6.

In the preparation of a dispersible powder 5 parts by weight of 2-(2-*n*-butoxyethoxy)-

ethyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate is intimately mixed with 90 parts by weight of kaolin and 5 parts by weight of "Belloid T.D." (a proprietary dispersing agent which is a condensate of formaldehyde and an alkyl aryl sulphonate). This composition may be diluted with water to form a dispersion suitable for herbicidal use. The word "Belloid" is a Registered Trade Mark.

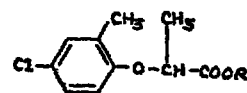
EXAMPLE 7.

In the preparation of a herbicidal dust 2 parts by weight of 2 - (2 - *n* - butoxyethoxy)-ethyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate is intimately mixed with 98 parts by weight of kaolin.

Compositions similar to those described in Examples 6 and 7 may be prepared in which the active ingredient is any of the compounds described in Examples 1, 2 and 3.

WHAT WE CLAIM IS:—

1. A compound having the formula:—



where R is an alkyl radical containing at least 3 carbon atoms, a phenyl substituted alkyl radical, an alkoxyalkyl radical or an alkoxyalkoxyalkyl radical.

2. A process for producing a compound as claimed in claim 1, in which process 4-chloro - 2 - methylphenol is condensed with an ester of an alpha - halopropionic acid of the formula $\text{CH}_3\text{—CHX—COOR}$, where R is as specified in claim 1 and X is a halogen atom.

3. A process for producing a compound as claimed in claim 1, in which process alpha-(4 - chloro - 2 - methylphenoxy) - propionic acid is esterified with an alcohol of the formula R—OH where R is as specified in claim 1.

4. A composition for controlling cleavers in growing crops, comprising a compound having the formula set forth in claim 1 and a carrier or diluent.

5. A composition as claimed in claim 4, in which the carrier or diluent comprises an emulsifying agent and if desired an organic solvent.

6. A composition as claimed in claim 4, in which the carrier or diluent comprises water, an emulsifying agent and if desired an organic solvent, so that the composition has the form of an emulsion.

7. A composition as claimed in claim 4, in which the carrier or diluent comprises a solid inert diluent, a dispersing agent, and if desired a wetting agent.

8. A composition as claimed in claim 4, in which the carrier or diluent comprises water, a solid inert diluent, a dispersing agent, and if desired a wetting agent so that the com-



- may be prepared in the following manner. A mixture of 176 grams of benzyl alcohol and 50 grams of alpha - bromopropionic acid is saturated with hydrogen chloride at 0° C. and the resulting mixture is allowed to stand overnight at room temperature. It is then washed with two 1 litre portions of water, 1 litre of 5N sodium bicarbonate solution and again with 1 litre of water. After drying over anhydrous sodium sulphate the washed reaction product is subjected to fractional distillation under reduced pressure and that fraction is collected which has a boiling point of 110° C. under a pressure of 1 mm. of mercury. There is thus obtained benzyl alpha-bromopropionate in the form of an oil which has a boiling point of 110° C./1 mm.
- 2 - Butoxyethyl alpha - bromopropionate which is employed in the preparation of 2-butoxyethyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate may be prepared in exactly similar manner to that described above for benzyl alpha-bromopropionate employing 193 grams of 2-butoxyethanol in place of 176 grams of benzyl alcohol. There is thus obtained 2-butoxyethyl alpha-bromopropionate in the form of an oil which has a boiling point of 94° C./1 mm.

EXAMPLE 4.

- In the preparation of a composition which gives an emulsion on dilution with water 4.9 grams of 2-ethylhexyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate is dissolved in 10 c.c. of a solvent comprising 9 c.c. of acetone and 1 c.c. of Ethylan C.P. (a proprietary emulsifying agent which is a polyethylene oxide condensate of an octylphenol).

EXAMPLE 5.

- In the preparation of a composition which gives an emulsion on dilution with water 4.9 grams of 2 - ethylhexyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate is dissolved in 10 c.c. of a solvent comprising 9 c.c. of xylene and 1 c.c. of Ethylan S.B. (a proprietary emulsifying agent which is a mixture of lauric diethanolamide and a polyethylene oxide condensate of an octylphenol).

- Similar compositions to those described in Examples 4 and 5 may be prepared in which the active ingredient consists of 4.0 grams of n - butyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, 4.25 grams of n-amyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, 5.3 grams of 2 - (2 - n - butoxyethoxy) - ethyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, 4.5 grams of benzyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, 4.7 grams of 2 - n - butoxyethyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate or 5.1 grams of 3:5:5-trimethylhexyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate.

EXAMPLE 6.

- In the preparation of a dispersible powder 5 parts by weight of 2-(2-n-butoxyethoxy)-

ethyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate is intimately mixed with 90 parts by weight of kaolin and 5 parts by weight of "Belloid T.D." (a proprietary dispersing agent which is a condensate of formaldehyde and an alkyl aryl sulphonate). This composition may be diluted with water to form a dispersion suitable for herbicidal use. The word "Belloid" is a Registered Trade Mark.

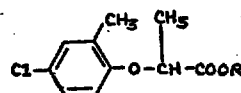
EXAMPLE 7.

In the preparation of a herbicidal dust 2 parts by weight of 2 - (2 - n - butoxyethoxy) - ethyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate is intimately mixed with 98 parts by weight of kaolin.

Compositions similar to those described in Examples 6 and 7 may be prepared in which the active ingredient is any of the compounds described in Examples 1, 2 and 3.

WHAT WE CLAIM IS:—

1. A compound having the formula:—



where R is an alkyl radical containing at least 3 carbon atoms, a phenyl substituted alkyl radical, an alkoxyalkyl radical or an alkoxyalkoxyalkyl radical.

2. A process for producing a compound as claimed in claim 1, in which process 4-chloro - 2 - methylphenol is condensed with an ester of an alpha - halopropionic acid of the formula $\text{CH}_3\text{—CHX—COOR}$, where R is as specified in claim 1 and X is a halogen atom.

3. A process for producing a compound as claimed in claim 1, in which process alpha - (4 - chloro - 2 - methylphenoxy) - propionic acid is esterified with an alcohol of the formula R—OH where R is as specified in claim 1.

4. A composition for controlling cleavers in growing crops, comprising a compound having the formula set forth in claim 1 and a carrier or diluent.

5. A composition as claimed in claim 4, in which the carrier or diluent comprises an emulsifying agent and if desired an organic solvent.

6. A composition as claimed in claim 4, in which the carrier or diluent comprises water, an emulsifying agent and if desired an organic solvent, so that the composition has the form of an emulsion.

7. A composition as claimed in claim 4, in which the carrier or diluent comprises a solid inert diluent, a dispersing agent, and if desired a wetting agent.

8. A composition as claimed in claim 4, in which the carrier or diluent comprises water, a solid inert diluent, a dispersing agent, and if desired a wetting agent so that the com-

position has the form of an aqueous dispersion.

9. A composition as claimed in claim 4, in which the carrier or diluent consists of a powdered solid so that the composition has

the form of a herbicidal dusting powder.
For the Applicants:

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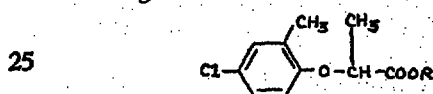
PROVISIONAL SPECIFICATION

Substituted Phenoxy-Propionic Acid Esters and Compositions containing them

We, BOOTS PURE DRUG COMPANY LIMITED, a British Company, of Station Street, Nottingham, do hereby declare this invention to be described in the following statement:—

The invention relates to new phenoxypropionic acid derivatives which have valuable herbicidal properties. In particular the new compounds produce a morphological response in cleavers (*Galium* species such as *Galium Aparine*) and chickweed (*Stellaria media*). Such activity has not previously been described in any other derivatives of phenoxypropionic acid and is all the more unexpected in view of the lack of activity against cleavers and chickweed shown by the correspondingly substituted phenoxyacetic acid derivatives.

The invention consists in the compounds of the general formula



in which R is an alkyl radical, a phenyl substituted alkyl radical, an alkoxyalkyl radical or an alkoxyalkoxyalkyl radical and in compositions thereof which may be used for plant growth regulating purposes.

The compounds of the invention may be prepared by the condensation of 4-chloro-2-methylphenol with the appropriate ester of an alpha-halopropionic acid. Alternatively they may be prepared by esterification of alpha-(4-chloro-2-methylphenoxy) propionic acid with the appropriate alcohol.

The compositions of the invention comprise the active ingredient in combination with an emulsifying agent and, if desired, an organic solvent which may be a water miscible solvent such as acetone or a water immiscible solvent such as xylene. The compositions according to the invention may also contain a wetting agent. These compositions, which are commonly referred to as "miscible oils" may be supplied to the user with instructions to dilute them with water, whereupon they spontaneously form emulsions and in this form the active ingredient may be applied to cleavers and chickweed in cereal crops to eradicate the cleavers and chickweed without harming the cereal plants. Alternatively the user may be supplied with a concentrated emulsion obtained from a "miscible oil" by the addition of approximately an equal volume of water. Such concentrated emulsions are diluted with

an appropriate amount of water before application to plants. The compositions of the invention therefore include the aforementioned miscible oils and the emulsions derived therefrom.

The following non-limitative examples illustrate the invention.

EXAMPLE 1.

In the preparation of ethyl alpha-(4-chloro-2-methylphenoxy) - propionate a mixture of 14.2 grams of 4 - chloro - 2 - methylphenol, 18.1 grams of ethyl alpha-bromopropionate and 15.5 grams of potassium carbonate in 200 c.c. of acetone is heated under reflux with stirring for 3 hours. The reaction product is cooled, filtered and the filtrate subjected to fractional distillation under reduced pressure. That fraction is collected which has a boiling point of 115—125° C. under a pressure of 3 m.m. of mercury and is redistilled. There is thus obtained ethyl alpha-(4-chloro-2-methylphenoxy)-propionate in the form of an oil which has a boiling point of 116—118° C. under a pressure of 3 m.m. of mercury. (Found: C, 59.5; H, 5.8. $C_{12}H_{11}O_3Cl$ requires C, 59.3%; H, 6.2%).

EXAMPLE 2.

In the preparation of *n*-butyl alpha-(4-chloro - 2 - methylphenoxy) - propionate a mixture of 21.5 grams of alpha - (4 - chloro-2 - methylphenoxy) - propionic acid, 22.2 grams of *n*-butanol, 0.3 c.c. of concentrated sulphuric acid and 30 c.c. of ethylene dichloride is heated under reflux for 6 hours. The reaction product is cooled, washed with 25 c.c. of 2*N* sodium hydroxide followed by two portions of 50 c.c. of water, dried over anhydrous magnesium sulphate and subjected to fractional distillation under reduced pressure. That fraction is collected which has a boiling point of 147—150° C. under a pressure of 3 m.m. of mercury and is redistilled. There is thus obtained *n*-butyl alpha - (4-chloro - 2 - methylphenoxy) - propionate in the form of an oil which has a boiling point of 138° C.—140° C. under a pressure of 2 m.m. of mercury.

In exactly similar manner using *n*-amyl alcohol and 2-ethylhexanol respectively in place of *n*-butanol there are prepared the following compounds:—

n-Amyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, b.p. 139—140° C./1.5 m.m. 2-ethylhexyl alpha - (4 - chloro - 2-

methylphenoxy) - propionate, b.p. 163—165° C./2 m.m. (Found: C, 66.6; H, 8.3. $C_{18}H_{27}O_4Cl$ requires C, 66.2; H, 8.3%).

EXAMPLE 3.

5 In the preparation of 2-(2-*n*-butoxyethoxy)-ethyl alpha - (4 - chloro - 2 - methylphenoxy)-propionate, a mixture of 21.5 grams of alpha - (4 - chloro - 2 - methylphenoxy) - propionic acid and 17.8 grams of diethylene glycol monobutyl ether is heated at 180° C. until the distillation of water ceases. The residue is cooled, diluted by the addition of 30 c.c. of ether and washed with two portions of 25 c.c. of 20% triethanolamine followed by three portions of 25 c.c. of water. The organic layer is dried over anhydrous sodium sulphate and the ether removed by distillation. There is thus obtained 2 - (2 - *n*-butoxyethoxy)ethyl alpha - (4 - chloro - 2-methylphenoxy) - propionate in the form of an oil, d_4^{20} 1.107.

In exactly similar manner using the appropriate alcohol in place of diethylene glycol monobutyl ether there are prepared the following compounds.

25 Benzyl alpha - (4 - chloro - 2 - methylphenoxy) - propionate, b.p. 196—8° C./3.5 m.m. (Found: C, 66.9; H, 5.6. $C_{17}H_{17}O_3Cl$ requires C, 67.0; H, 5.6%).

30 2 - Butoxyethyl alpha - (4 - chloro - 2-methylphenoxy) - propionate, b.p. 188° C./3 m.m. (Found: C, 61.0; H, 7.5. $C_{18}H_{28}O_4Cl$ requires C, 61.1; H, 7.3%).

3:5:5-Trimethylhexyl alpha - (4 - chloro-

2 - methylphenoxy) - propionate, b.p. 172—176° C./1 m.m. (Found: C, 67.0; H, 8.6. $C_{19}H_{29}O_4Cl$ requires C, 67.0; H, 8.5%).

EXAMPLE 4.

In the preparation of a composition which gives an emulsion on dilution with water 4.9 grams of 2-ethylhexyl alpha - (4 - chloro - 2-methylphenoxy) - propionate is dissolved in 10 c.c. of a solvent comprising 9 c.c. of acetone and 1 c.c. of Ethylan C.P. (a proprietary emulsifying agent which is a polyethylene oxide condensate of an octylphenol).

EXAMPLE 5.

In the preparation of a composition which gives an emulsion on dilution with water 4.9 grams of 2-ethylhexyl alpha - (4 - chloro - 2-methylphenoxy) - propionate is dissolved in 10 c.c. of a solvent comprising 9 c.c. of xylene and 1 c.c. of Ethylan S.E. (a proprietary emulsifying agent which is a mixture of lauric diethanolamide and a polyethylene oxide condensate of an octylphenol).

Similar compositions to those described in Examples 4 and 5 may be prepared in which the active ingredient consists of 4.0 grams of *n*-butyl alpha-(4-chloro-2-methylphenoxy)-propionate or 4.25 grams of *n*-amyl alpha - (4 - chloro - 2 - methylphenoxy)-propionate.

For the Applicants:—

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