

PATENT SPECIFICATION

NO DRAWINGS

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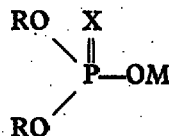
COMPLETE SPECIFICATION

An Insecticidal Composition

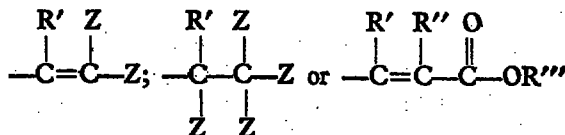
We, SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ N.V., a company organised under the laws of The Netherlands, of 30 Carel van Bylandtlaan, The Hague, The Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to shaped compositions or articles comprising an active component and an outer layer, the active com-

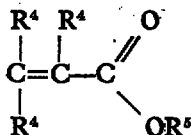
ponent comprising, as active ingredient, a volatile insecticidal organic phosphorus compound having the general formula:—



in which the R groups are alkyl groups, X is oxygen or sulphur, and M is a group of the structure



in which R' is hydrogen or an alkyl group, Z is halogen, R'' is hydrogen, an alkyl group or halogen and R''' is alkyl, aryl, aralkyl or alkaryl group, together with a carrier and, optionally also an additional dye, a pigment, a lubricant, a binder, a filler, an antioxidant, a stabilizer, a perfume or a deodorant; the outer layer consisting of a copolymer of an ethylenically unsaturated hydrocarbon and a compound of the structure



wherein each R⁴ is hydrogen or an alkyl group of from 1 to 4 carbon atoms and R⁵ is an alkyl group of from 1 to 10 carbon atoms, and being a layer through which the volatile

insecticide can be emitted into the outside air.

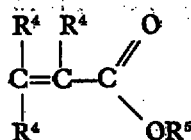
The active ingredient of the active component may be absorbed in a thermoplastic material as a carrier and preferably the volatile insecticidal organic phosphorus compound is present in solid solution in the thermoplastic material. The invention therefore preferably relates to shaped compositions or articles as defined above wherein the carrier is of a thermoplastic material.

By allowing the insecticide, which may be present in solid solution, to evaporate into a space through the surface of the thermoplastic article and through the outer layer, a concentration can be obtained in that space which is fatal for insects but harmless for human beings, pets or cattle. The known commercially available polyvinyl chloride strips which contain dimethyl 2,2-dichlorovinyl phosphate (VAPONA-strips; VAPONA

[Price 5s. 0d.]

registered trade name) possess this specific activity.

- 5 The Applicants have now found that a higher degree of effectiveness can be obtained by means of an insecticidal composition, or article comprising an active component which is provided with an outer layer comprising a material through which the volatile insecticide is emitted into the outside air, in which
10 the material of the outer layer comprises a copolymer of an ethylenically unsaturated hydrocarbon and of a compound of the structure



- 15 wherein each R^4 is hydrogen or an alkyl group of from 1 to 4 carbon atoms and R^5 is an alkyl group of from 1 to 10 carbon atoms.

- 20 The rate of emission of insecticide will drop even less rapidly in the course of time and the composition will be more effective.

- The active component may have any shape which is suitable for emitting sufficient insecticide into the space and may be porous, plate-shaped, bar-shaped or strip-shaped.
25 When the carrier is a thermoplastic material the active component can be obtained by means of injection moulding, extrusion or any other methods known in the plastic industry for the production of articles.

- 30 Preferably used insecticides are dimethyl 2,2 - dichlorovinyl phosphate; 1,2 - dibromo - 2,2 - dichloroethyl dimethyl phosphate; 2 - carbomethoxy - 1 - methylvinyl dimethyl phosphate and 2 - (1 - phenylcarbomethoxy) - 1 - methylvinyl dimethyl phosphate or its analogous diethyl compound. The preferably used insecticides have a vapour pressure of at least 10^{-3} mm Hg at 20°C , such as dimethyl 2,2-dichlorovinyl phosphate.

- 40 The amount of insecticidal organic phosphorus compound which is present in a carrier of a thermoplastic material can vary considerably. For instance, active components may be obtained which contain 5 to 75% by weight of volatile insecticide, based on the total mixture. The percentages by weight lie particularly between 10 and 45% by weight. They may be prepared by mixing the insecticide with the pulverulent thermoplastic material and by subsequently processing the mixture, for example by extrusion, moulding or casting.

- 55 Suitable thermoplastic materials as carrier are, for example, polyethylene, polypropylene, copolymers of ethylene and propylene, nylon, Cellophane (registered Trade Mark), polyamides, polyesters, polyacrylates, such as polymers and copolymers of methylacrylate, ethylacrylate, methylmethacrylate, and ethyl-

methacrylate; polymers of vinyl compounds such as polystyrene, polymerized divinylbenzene; polyvinyl halides, for instance polyvinylchloride; polyvinyl acetals, for instance polyvinyl butyral; polyvinylidene compounds, such as polyvinylidene chloride; polyvinylacetate; ethylenevinylacetate copolymers; copolymers of vinylchloride and vinylacetate; polyurethanes, polyaldehydes, cellulose derivatives or thermoplastic rubbers. Preferably used thermoplastics are polymers or copolymers of vinylchloride or chlorinated polyethylene.

The preferred thermoplastic outer layer, which ensures regular emission of insecticide to the outside air, may be 10 to 200 microns thick, preferably 15 to 50 microns. The outer layer is arranged for example round the active component in the form of a film or shrunk film. Alternatively the composition or article may be formed by laminating together the active component and the outer layer. The outer layer can therefore be separate from the active component, as in the case of a film, or be attached to it, as in the case of a laminate.

The outer layer comprising the above-mentioned copolymer is preferably composed of a copolymer of ethylene and butylacrylate or an acrylate wherein the butyl group is replaced by a methyl-, ethyl-, propyl-, pentyl-, isopentyl-, hexyl-, heptyl-, 2-ethylhexyl-, octyl-, nonyl- or decyl group; more preferably of a copolymer of ethylene and butylacrylate.

Moreover the copolymer can be mixed with polyethylene which seemingly acts as an inert filler. The weight ratios of the amount of polyethylene and the amount of copolymer can vary considerably, preferably between 25/75 and 75/25.

EXAMPLE

A commercially available strip of polyvinylchloride was used, comprising 20% by weight of dimethyl 2,2-dichlorovinyl phosphate as insecticide and also a plasticiser. A film of the copolymer of ethylene and of butylacrylate (thickness 200 microns) was used as outer layer and the emission rate of dimethyl 2,2 - dichlorovinylphosphate was measured in mg per hour after a number of days:

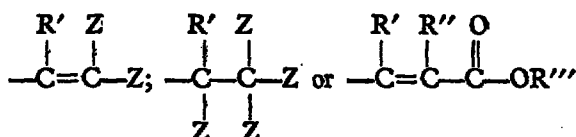
1 day	8,5 mg/h
10 days	8,5 mg/h
20 days	8,5 mg/h
30 days	8,5 mg/h
40 days	7,5 mg/h
50 days	6,0 mg/h
60 days	5,0 mg/h
70 days	4,8 mg/h
80 days	4,8 mg/h
90 days	4,2 mg/h

It turns out that the release rate is even more continuous than that of the same strip wrapped in a film of a copolymer of ethylene and vinylacetate which begins with a higher release rate the first 30 days and falls more rapidly down after the thirtieth day.

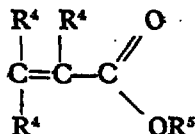
The invention also relates to a process for combating insects by subjecting the locus of the insects to vapour of the insecticide which has been emitted from the composition according to the invention described above.

WHAT WE CLAIM IS:—

1. Shaped composition or article compris-



in which R' is hydrogen or an alkyl group, Z is halogen, R'' is hydrogen, an alkyl group or halogen and R''' is an alkyl, aryl, aralkyl or alkaryl group together with a carrier and optionally also an additional dye, a pigment, a lubricant, a binder, a filler, an antioxidant, a stabilizer, a perfume or deodorant; and the outer layer consisting of a copolymer of an ethylenically unsaturated hydrocarbon and a compound of the structure



wherein each R⁴ is hydrogen or an alkyl group of from 1 to 4 carbon atoms and R⁵ is an alkyl group of from 1 to 10 carbon atoms, and being a layer through which the volatile insecticide can be emitted into the outside air.

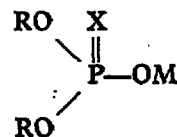
2. Shaped composition or article as claimed in claim 1, wherein the active ingredient is absorbed in a thermoplastic material as carrier.

3. Shaped composition or article as claimed in claim 2, wherein the active ingredient is present in solid solution in the thermoplastic material.

4. Shaped composition or article as claimed in claim 2 or 3, wherein the active component comprising the active ingredient and the thermoplastic material has been subjected to shaping e.g. extrusion or injection moulding, and as a result of it a shaped article is obtained.

5. Shaped composition or article as claimed in any one of the claims 1—4, wherein the outer layer of the shaped article is a film or a shrunk film.

ing an active component and an outer layer, the active component comprising, as active ingredient a volatile insecticidal organic phosphorus compound having the general formula:—



in which the R groups are alkyl groups, X is oxygen or sulphur, and M is a group of the structure

6. Shaped composition or article as claimed in any one of the claims 1—4 when formed by laminating together the active component and the outer layer.

7. Shaped composition or article as claimed in any one of the claims 1—6, wherein the outer layer comprises a copolymer of ethylene and butylacrylate.

8. Shaped composition or article as claimed in any one of the claims 1—7, wherein the outer layer comprises as additional material polyethylene.

9. Shaped composition or article as claimed in claim 7 or 8, wherein the outer layer has a thickness of 10—200 microns.

10. Shaped composition or article as claimed in claim 9, wherein the outer layer has a thickness of 15—50 microns.

11. Shaped composition or article as claimed in any one of the preceding claims, wherein an active component of dimethyl 2,2-dichlorovinyl phosphate and polyvinyl chloride has been shaped by extrusion or injection moulding and has been provided with a thermoplastic outer layer as defined in claim 1, 7, 8, 9 or 10.

12. Shaped composition or article as claimed in claim 1 and as hereinbefore described with special reference to the Example.

13. A process for combating insects, which comprises subjecting the locus of the insects to the vapour of the insecticide, which has been emitted from a shaped composition or article as claimed in any one of the preceding claims.

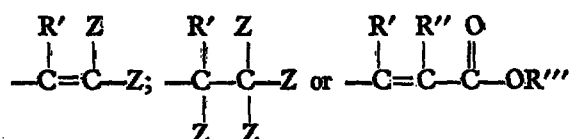
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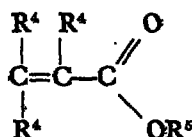
The invention also relates to a process for combating insects by subjecting the locus of the insects to vapour of the insecticide which has been emitted from the composition according to the invention described above.

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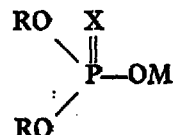
2. Shaped composition or article as claimed in claim 1, wherein the active ingredient is absorbed in a thermoplastic material as carrier.

3. Shaped composition or article as claimed in claim 2, wherein the active ingredient is present in solid solution in the thermoplastic material.

4. Shaped composition or article as claimed in claim 2 or 3, wherein the active component comprising the active ingredient and the thermoplastic material has been subjected to shaping e.g. extrusion or injection moulding, and as a result of it a shaped article is obtained.

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10. Shaped composition or article as claimed in claim 9, wherein the outer layer has a thickness of 15—50 microns.

11. Shaped composition or article as claimed in any one of the preceding claims, wherein an active component of dimethyl 2,2-dichlorovinyl phosphate and polyvinyl chloride has been shaped by extrusion or injection moulding and has been provided with a thermoplastic outer layer as defined in claim 1, 7, 8, 9 or 10.

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