

FIG. 1

**Abstract :**

An insecticidal composition of Acephate and Bifenthrin with more enhanced synergistic activity. The insecticidal composition includes Acephate active ingredient and w/w Bifenthrin active ingredient along with other ancillaries to produce dry flow able, low compact, dust free granules.

*Rawal*

AGENT FOR THE APPLICANT)



## CLAIMS:

We Claim :

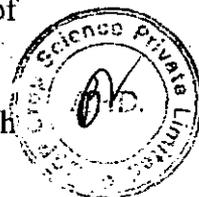
1. A synergistic insecticidal product composition comprising:

- a) 0.2 to 10% w/w Bifenthrin technical, and
- b) 0.1 to 50% w/w Acephate technical.
- c) 0.01 to 10.0% w/w of solubilizer;
- d) 0.002 to 0.005% w/w of an emetic agent;
- e) 1.0 to 10.0% w/w of disintegrating agent;
- f) 0.01 to 0.5% w/w an antifoaming agent;
- g) 0.5 to 5.0% w/w a wetting cum dispersing agent;
- h) 0.1 to 5.0% w/w an anticaking agent;
- i) 0.05 to 0.5% w/w a dye; and
- j) an inert filler to make 100% w/w.

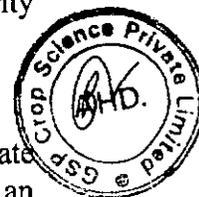
and

A process for the preparation of an enhanced synergistic insecticidal composition comprising:

- a) Premixing a quantity of Bifenthrin with a solubilizer and an emetic agent to prepare a spray solution.
  - b) Premixing a quantity of Acephate with a wetting cum dispersing agent to prepare an Acephate mixture.
  - c) Grinding the Acephate mixture to achieve intimate and efficient mixing of particles and the post-mixing to produce a very homogeneous mixture.
  - d) Spraying the spray solution on the homogeneous mixture and mixing thoroughly for a sufficient time to produce a homogeneous bulk.
  - e) Feeding the homogeneous bulk to a granulator to produce granules.
  - f) Drying, sizing and sieving the granules, and
  - g) Optionally, recycling any fines collected after sieving to the granulator.
2. The composition of claim 1, comprising 0.5 to 10% Bifenthrin and 0.5 to 50% w/w Acephate.
3. The composition of claim 2, comprising Bifenthrin and Acephate in a ration of 1:1 to 1:10.
4. The composition of claim 1, comprising Bifenthrin of 97% w/w purity which includes isomer.
5. The composition of claim 1, wherein the solubilizer is an ethoxylate of vegetable oil or a mixture thereof.



6. The composition of claim 1, wherein the emetic agent is a lignocaine derivative or a formulation thereof.
7. The composition of claim 1, wherein the disintegrating agent is a swelling type of clay selected from the group consisting of bentonite, zeolite, and attapulgite or an inorganic salt selected from the group consisting of sodium sulphate and ammonium sulphate.
8. The composition of claim 1, wherein the antifoaming agent is a silicon oil derivative or a combination thereof.
9. The composition of claim 1, wherein the wetting cum dispersing agent is a salt of alkyl aryl sulphonate.
10. The composition of claim 1, wherein the anticaking agent is anhydrous magnesium sulphate.
11. The composition in claim 1, wherein the filler is selected from the group consisting of precipitated silica and diatomaceous earth kaolin.
12. The composition of claim 12, wherein the precipitated silica and diatomaceous earth kaolin are present in 8.995 w/w min to 98.025 w/w max.
13. The process in claim 1, wherein the quantity of Bifenthrin is 0.2 to 10% w/w and the quantity of Acephate is 0.1 to 50% w/w.
14. The process in claim 1, wherein said insecticidal composition includes mixing the quantity of Bifenthrin and Acephate in a ratio 1:1 to 1:5.
15. The process of claim 1, wherein the quantity of Bifenthrin has 97% w/w purity which includes isomer.
16. The process of claim 1, further including premixing the quantity of Acephate with an emetic agent, an antifoaming agent, a disintegrating agent, an anticaking agent, a dye and an inert filler.
17. The process of claim 1, wherein the solubilizer is ethoxylate of vegetable oil or a mixture thereof.



18. The process of claim 1, wherein the emetic agent is lignocaine derivative or a formulation thereof.
19. The process of claim 1, wherein the disintegrating agent is a swelling type clay selected from the group consisting of bentonite, zeolite, and attapulgite or an inorganic salt selected from the group consisting of sodium sulphate or ammonium sulphate.
20. The process of claim 1, wherein the antifoaming agent is a silicone oil derivative or a combination thereof.
21. The process of claim 1, wherein the dispersing cum wetting agent is a salt of alkyl aryl sulphonate.
22. The process of claim 1, wherein the anticaking agent is anhydrous magnesium sulphate.
23. The process of claim 1, wherein the filler is precipitated silica and diatomaceous earth kaolin.
24. The process of claim 1, wherein the precipitated silica and diatomaceous earth kaolin are present in the ration of 1:10 to 10 : 1.



## **BACKGROUND OF THE INVENTION**

### **1. Field of Invention**

The present invention relates to an insecticidal composition of Acephate and Bifenthrin with enhanced synergistic insecticidal activity and a process to prepare the same.

### **2. Description of Related Art**

1. To protect the crop from insect pest damage it is now very essential in agricultural produce enhancement. To fight with these problems, numerous chemicals and formulations were invented for controlling or managing pests. Insecticides of many types and groups are reported in literature to control agricultural pests effectively.
2. Effectiveness of insecticides in combination have superseded than when applied individually. Combination of insecticides demonstrates more potency and activity level than from a mere addition of the individual potencies of the component.
3. The current agricultural scenarios, insects have become immune to pesticides because of its indiscriminate use. For producing higher crop yield potent synergistic insecticidal composition is of more use to manage and control pests.
4. Acephate is presently recognized as systemic insecticide of moderate persistence with residual activity and thrips. It is phytotoxic on many crop plants. Acephate formulation currently in use is Acephate 75% w/w Soluble

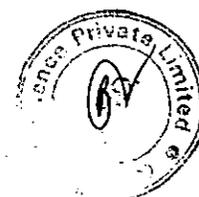


powder (SP), surfactant 1% to 2% w/w and inert filler (Precipitated Silica) to make 100% w/w. It creates lot many problems like dust, low pourability, high transportation cost, and high capital manufacturing investment. This formulation is not easily measurable, presents difficulties in packing material disposal, produces handling problems, and poses high risk of caking along with other problems.

5. Bifenthrin is recognized as a member of the pyrethroid chemical class. It is an insecticide and acaricide which affects the nervous system and causes paralysis in insects. It is also used to control wide range of pests, especially Coleoptera, Diptera, Heteroptera, Lepidoptera and Orthoptera, it also controls some species of Acarina and other classes of fruits including Citrus, ines, Vegetables, Potatoes, Cereals, maize, Soyabeans.
6. Presently Bifenthrin is formulated in form of emulsifiable concentrate (EC) which contains Bifenthrin as active ingredient. The organic solvent used in EC formulation exhibits toxicity and side-effects which may be adverse to the effect of the agricultural chemical itself or to the plant or the crop as a whole or its parts produced in treated fields. They show hazards during manufacturing, filling, packing, storage, transit and use. Precutaneous toxicity and inflammability may also occur by using these organic solvents.
7. A mixture of organophosphate and pyrethroids have been reported in the literature, but these are administered as separate sprays or tank mixes. Formulation containing both are not reported.

#### **BRIEF SUMMARY OF THE INVENTION**

1. The present insecticidal composition with enhanced synergistic insecticidal activity includes the active ingredient Bifenthrin and Acephate along with necessary surface active agent(s) and filler(s). The present invention is also directed to a process for making dry flow, low compact, dust free granules including the insecticidal composition. In a preferred embodiment, the

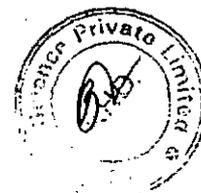


insecticidal composition including Bifenthrin and Acephate is prepared with the addition of solubilizer, a wetting cum dispersing agent, a disintegrating agent, an emetic agent, an antifoaming agent, an anticaking agent, dye(s) and filler(s).

2. The prominent results of each active ingredients, i.e. residual activity and anti-feeding action, are synergistically combined to yield an insecticidal composition of improved efficiency, in the form of higher crop yields. The content of active ingredients, preferably mass of active ingredients per hectare, is significantly less than that required when these two active ingredients are employed separately, under identical conditions. When single ingredient in high dose and for long time is used there is chance of resistance development, which is reduced drastically when combination of Acephate and Bifenthrin is used. The present insecticidal composition gives a *quick knockdown kill* of the pests. It is comparatively more persistent and penetrates deep into the leaves, killing many internal feeders. It is strongly active as a contact and stomach insecticide. It is a potent lethal weapon to kill hard-to-kill, resistant insect pests, which are normally not controlled by other insecticides. The insecticidal composition of Bifenthrin and Acephate has the beneficial effect for controlling Cotton bollworms and sucking pests. Its toxicity is low and safe for humans and animals and its residue is small.
3. The present insecticidal composition minimizes dermal and respiratory toxic exposure to users and also eliminates precutaneous toxicity and flammability hazard since it does not contain any organic solvent. The insecticidal composition provided is relatively more advantageous and exhibits very desirable results.

#### **BRIEF DESCRIPTION OF THE DRAWING**

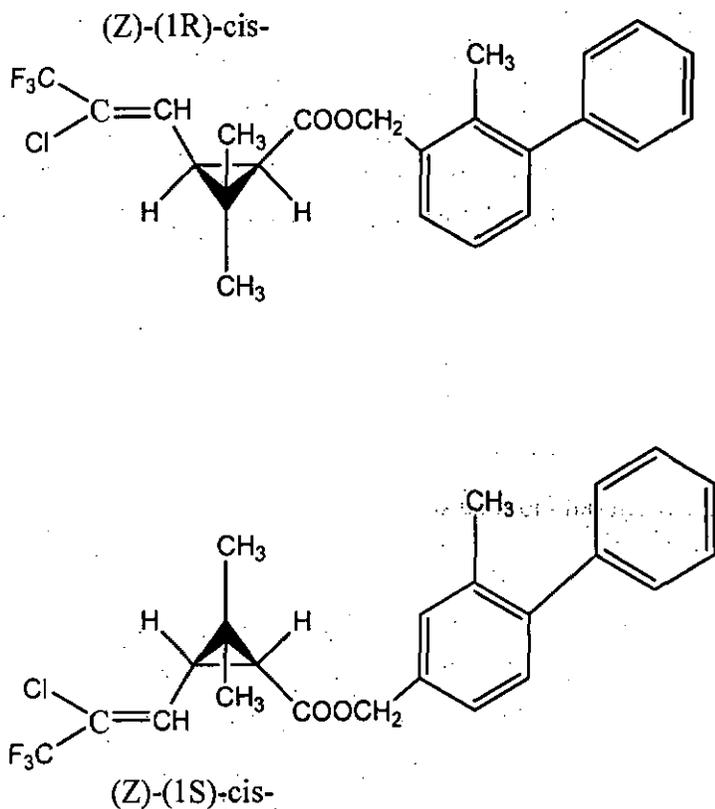
1. The advantage of present invention is very well apparent from the following detailed description of a preferred embodiment thereof, taken in conjunction with the accompanying drawing in which:



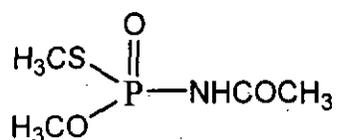
2. FIG.1 is a flow diagram describing the preferred process for preparing the insecticidal composition of the present invention.

### DETAILED DESCRIPTION OF THE INVENTION

1. The insecticidal combination of Bifenthrin and Acephate is produced with enhanced insecticidal activity along with necessary surface active agent(s) and inert filler(s). The insecticidal composition preferably includes 0.1 to 50% w/w Acephate and 0.2% to 10% w/w Bifenthrin. In yet another preferred embodiment, the active ingredient is present in a quantity of 1.0 to 40% w/w and active ingredient Bifenthrin is present in the quantity of 0.2 to 8.0 % w/w. Additionally, the Bifenthrin used may preferably include isomer
2. Bifenthrin is an insecticide of pyrethroid group and describes a chemical substance having solubility in water of <1 microgram/ litre. Bifenthrin corresponds to a mixture of isomers having the following formula.

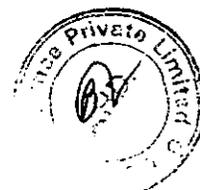


3. Acephate is an organophosphate insecticide, preferably provided at a purity of 90-97 %w/w. Acephate is colourless crystalline solid with a melting point of 82-89°C having a solubility at room temperature with about 650 g/ltr water ; >100g/ltr acetone ; ethanol ; <50g/ltr aromatic solvents. The structural formula of Acephate is as follows :



{0018} In a preferred embodiment, the insecticidal composition includes the following

(i)	Bifenthrin (active ingredient)	0.2 – 10%
(ii)	Acephate (active ingredient)	0.1 – 50%
(iii)	Solubilizer	0.01 – 10.0%
(iv)	Emetic agent	0.002 – 0.005%
(v)	Disintegrating agent	1.0 – 10.0%
(vi)	Antifoaming agent	0.01 – 0.5%
(vii)	Wetting cum dispersing agent	0.5 – 5.0%
(viii)	Anticaking agent	0.1 – 5.0%
(ix)	Dye(s)	0.05 – 0.5%
(x)	Filler(s)	to make 100% (w/w)



4. In a preferred embodiment, the insecticidal composition is prepared comprising the following steps:

- 1) Premixing a required quantity of Bifenthrin, preferably Bifenthrin technical, with a required quantity of a solubilizer and an emetic agent to prepare a spray solution,

- 2) Premixing a required quantity of Acephate, preferably Acephate technical, with a required quantity of wetting cum dispersing agent and any other necessary additive(s) and filler(s), preferably and antifoaming agent, a disintegrating agent, an anticaking agent, dye(s) and required quantity of inert filler(s) to prepare an Acephate mixture,
  - 3) Grinding the Acephate mixture to achieve intimate and efficient mixing of particles and then post-mixing to produce a homogeneous mixture,
  - 4) Spraying the spray solution on the homogeneous mixture and again mixing thoroughly for sufficient time to have a homogeneous bulk,
  - 5) Feeding the homogeneous bulk of step 4), preferably after passing quality tests, to a granulator, preferably through a screw feeder into a hopper of a granulator, for granulation to produce granules,
  - 6) Drying, sizing and sieving the granules,
  - 7) Optionally, recycling any fines collected after sieving to the granulator.
5. The granules, thus obtained, are preferably tested for required quality specifications. Once the granules pass quality tests, they are preferably filled and packed in desired packing. This process gives 99.4% yield conversion. The granules, with incorporation of inert ingredients by proper choice, enjoy all the advantages as discussed before, making it beneficial from an economic aspect and a handling aspect and shows a very good performance during application. The granules prepared as provided are dust free granules, with good pourability, stability, dispersibility, and free flowability. The granules preferably have a diameter of 0.5 to 1.0 mm and having a storage stability for a minimum of two years.
6. The following is the list of preferred ingredients and should not be construed to limit the invention. In a preferred embodiment, the Bifenthrin used is Bifenthrin technical preferably having at least 97% w/w purity. In a preferred embodiment, the Acephate used is Acephate technical preferably having purity of at least 97% w/w. The solubilizer is preferably a derivative of ethoxylates of vegetable oil or a mixture of one or more of these. The preferred emetic agent is lignocaine derivative or a formulation thereof. The disintegrating agent is preferably selected from swelling type of clays like bentonite, zeolite, attapulgite and inorganic salts like sodium or ammonium sulphate. The



antifoaming agent is preferably a silicone oil derivative. The wetting cum dispersing agent is preferably selected from salts of alkyl sulphonates. The dye used may preferably have a sunset yellow colour. The filler is preferably selected from precipitated silica and diatomaceous earth kaolin in the ratio 1:10 to 10:1.

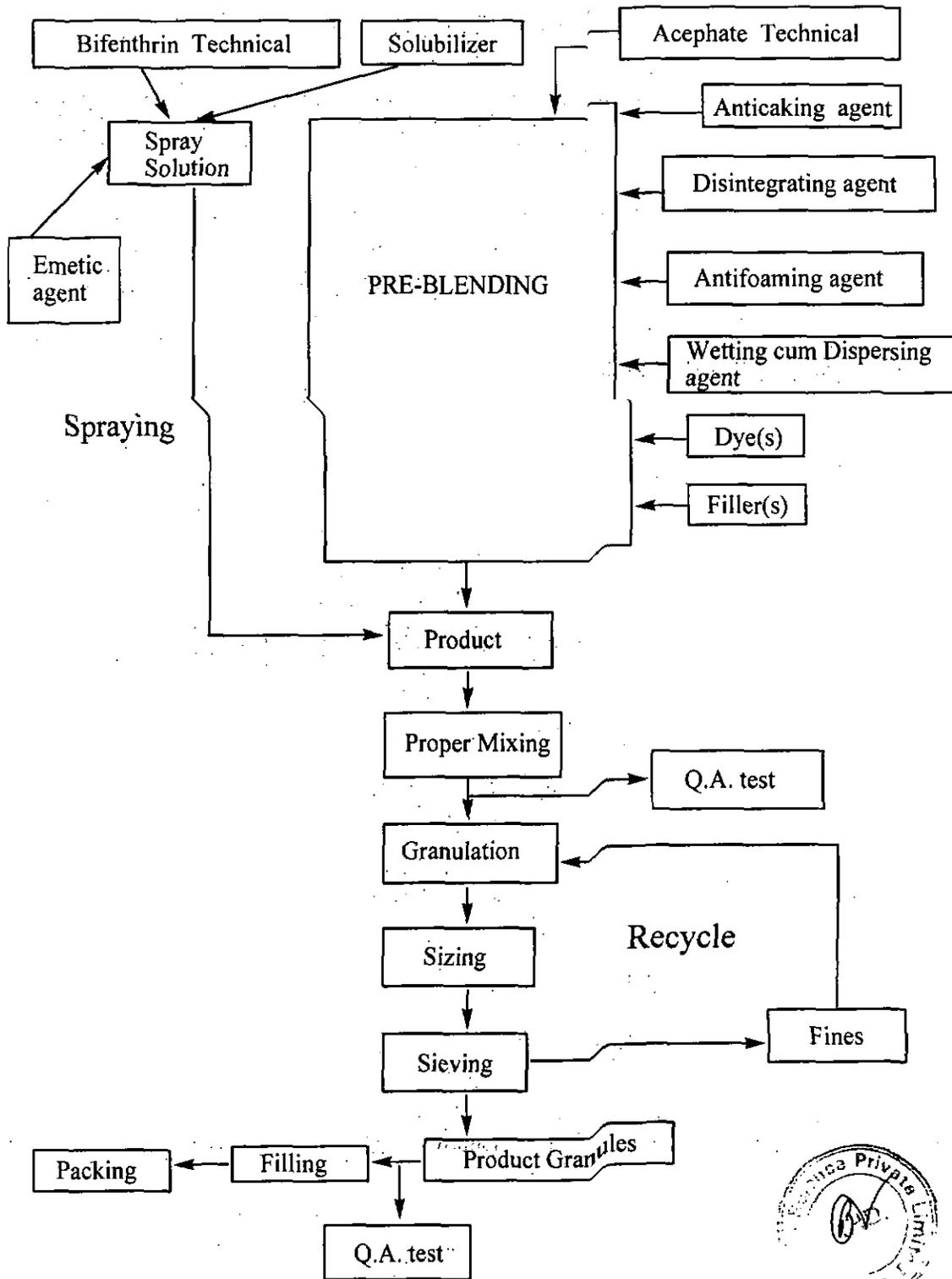


FIG. 1

## CLAIMS:

We Claim :

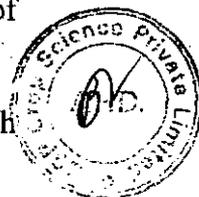
1. A synergistic insecticidal product composition comprising:

- a) 0.2 to 10% w/w Bifenthrin technical, and
- b) 0.1 to 50% w/w Acephate technical.
- c) 0.01 to 10.0% w/w of solubilizer;
- d) 0.002 to 0.005% w/w of an emetic agent;
- e) 1.0 to 10.0% w/w of disintegrating agent;
- f) 0.01 to 0.5% w/w an antifoaming agent;
- g) 0.5 to 5.0% w/w a wetting cum dispersing agent;
- h) 0.1 to 5.0% w/w an anticaking agent;
- i) 0.05 to 0.5% w/w a dye; and
- j) an inert filler to make 100% w/w.

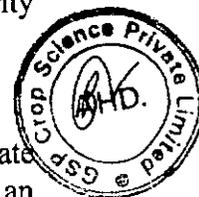
and

A process for the preparation of an enhanced synergistic insecticidal composition comprising:

- a) Premixing a quantity of Bifenthrin with a solubilizer and an emetic agent to prepare a spray solution.
  - b) Premixing a quantity of Acephate with a wetting cum dispersing agent to prepare an Acephate mixture.
  - c) Grinding the Acephate mixture to achieve intimate and efficient mixing of particles and the post-mixing to produce a very homogeneous mixture.
  - d) Spraying the spray solution on the homogeneous mixture and mixing thoroughly for a sufficient time to produce a homogeneous bulk.
  - e) Feeding the homogeneous bulk to a granulator to produce granules.
  - f) Drying, sizing and sieving the granules, and
  - g) Optionally, recycling any fines collected after sieving to the granulator.
2. The composition of claim 1, comprising 0.5 to 10% Bifenthrin and 0.5 to 50% w/w Acephate.
3. The composition of claim 2, comprising Bifenthrin and Acephate in a ration of 1:1 to 1:10.
4. The composition of claim 1, comprising Bifenthrin of 97% w/w purity which includes isomer.
5. The composition of claim 1, wherein the solubilizer is an ethoxylate of vegetable oil or a mixture thereof.



6. The composition of claim 1, wherein the emetic agent is a lignocaine derivative or a formulation thereof.
7. The composition of claim 1, wherein the disintegrating agent is a swelling type of clay selected from the group consisting of bentonite, zeolite, and attapulgite or an inorganic salt selected from the group consisting of sodium sulphate and ammonium sulphate.
8. The composition of claim 1, wherein the antifoaming agent is a silicon oil derivative or a combination thereof.
9. The composition of claim 1, wherein the wetting cum dispersing agent is a salt of alkyl aryl sulphonate.
10. The composition of claim 1, wherein the anticaking agent is anhydrous magnesium sulphate.
11. The composition in claim 1, wherein the filler is selected from the group consisting of precipitated silica and diatomaceous earth kaolin.
12. The composition of claim 12, wherein the precipitated silica and diatomaceous earth kaolin are present in 8.995 w/w min to 98.025 w/w max.
13. The process in claim 1, wherein the quantity of Bifenthrin is 0.2 to 10% w/w and the quantity of Acephate is 0.1 to 50% w/w.
14. The process in claim 1, wherein said insecticidal composition includes mixing the quantity of Bifenthrin and Acephate in a ratio 1:1 to 1:5.
15. The process of claim 1, wherein the quantity of Bifenthrin has 97% w/w purity which includes isomer.
16. The process of claim 1, further including premixing the quantity of Acephate with an emetic agent, an antifoaming agent, a disintegrating agent, an anticaking agent, a dye and an inert filler.
17. The process of claim 1, wherein the solubilizer is ethoxylate of vegetable oil or a mixture thereof.



18. The process of claim 1, wherein the emetic agent is lignocaine derivative or a formulation thereof.
19. The process of claim 1, wherein the disintegrating agent is a swelling type clay selected from the group consisting of bentonite, zeolite, and attapulgite or an inorganic salt selected from the group consisting of sodium sulphate or ammonium sulphate.
20. The process of claim 1, wherein the antifoaming agent is a silicone oil derivative or a combination thereof.
21. The process of claim 1, wherein the dispersing cum wetting agent is a salt of alkyl aryl sulphonate.
22. The process of claim 1, wherein the anticaking agent is anhydrous magnesium sulphate.
23. The process of claim 1, wherein the filler is precipitated silica and diatomaceous earth kaolin.
24. The process of claim 1, wherein the precipitated silica and diatomaceous earth kaolin are present in the ration of 1:10 to 10 : 1.

