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(54) Title: COMPOSITION FOR OBTAINING STABLE CONCENTRATED SOLUTION OF WATER INSOLUBLE COPPER COMPOUNDS AND METHOD FOR PREPARATION THEREOF

(57) Abstract: This invention describes a composition for obtaining copper compounds concentrated suspensions by using a mixture of inert coadjuvant substances that increase the stability of the suspensions in stock bottles and after mixture with water and the method for preparing such compositions.



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“COMPOSITION FOR OBTAINING STABLE CONCENTRATED SOLUTION OF WATER INSOLUBLE COPPER COMPOUNDS AND METHOD FOR PREPARATION THEREOF.”

5 This Patent of Invention comprises a composition of coadjutant substances added to copper compound suspensions capable to increase the stability of such formulations thereby increasing the service life of the final product and also comprises the method for preparation of such compositions.

10 In Brazil, water insoluble copper compounds concentrated suspensions (copper hydroxide, copper oxychloride, cupric oxide, cuprous oxide, tribasic copper sulfate, etc) are usually used in the agrochemical sector, besides being applied to other sectors, such as:

- a) Copper oxide: welding paste, catalyst, metallurgical industry;
- b) Copper hydroxide: ceramics, metallurgical industry;
- 15 c) Copper oxychloride: fireworks, paints;
- d) Copper tribasic sulfate: veterinary industry, etc.

20 Most of the compounds commercially available are sold in powdered form; however, homogenous suspensions are difficult to prepare due to such compounds physical and chemical properties, which agglomerate easily in water thereby forming a pasty precipitate with adhesive characteristics.

25 Several alternatives to the development of liquid formulations of water insoluble copper compounds have been carried out in Brazil, however the issue of strong settling down has not yet been solved, which represents a problem, since usually such suspensions remain warehoused for a few months before being put to use. To give an idea of the severity of such problem, during the storage up to 70% of the cupric ingredients is liable to settle down, thereby reducing the copper contents in the suspension. After settling down, the compounds adhere to the bottom of the package making it almost impossible to use the settled down pasty

copper compound. Even when a homogeneous suspension is again obtained, it remains stable for no more than a few minutes.

Nevertheless, this problem can be alleviated by using inert coadjutant substances (solvents, dispersants, moisteners, anti-foamers, etc.) compatible with the intended suspension compound. That way, the study of the formulation stability in the presence of such substances is essential to determine if the coadjutant is able to arouse alterations in the physical and chemical characteristics of the compounds (or in the mixture of the compounds).

Concentrated suspensions of water insoluble copper compounds were prepared in the presence of several inert coadjutant substances (in this case, tense-active substances) typically present in concentrated suspensions of agrotoxic substances, cosmetics and medicine drugs. In addition, aiming at increasing the effectiveness of the finished product, regardless of its use (fertilizer, fungicidal, bactericidal, dyer, etc), other coadjutant types were tested, such as: antifreezes, anti-foamers, adhesive and compatibilizing agents. The evaluated adjutant substances presenting the best compatibility/ stability ratio were chosen for the final formulation of this invention.

This invention comprises the formulation of an insoluble copper compound suspension that remains in the stock tube without phase separation for time periods exceeding twenty (20) months and for up three (3) days after dilution in water for using. Such formulation is prepared with the following components: **water, dispersing agent** (ethylene oxide/ propylene oxide condensate or alkyl, aryl, ethoxylate alkylaryl or lignosulphonated or formaldehyde condensate or mixtures thereof), **moistening agents** (naphthalene formaldehyde condensate or naphthalene- formaldehyde sulphonate or polycarboxylate or mixtures thereof), **antifreeze agents** (ethylene glycol or propylene glycol or ethylene or mixtures thereof), **adhesive** (precipitated silica or polyvinyl alcohol or polyvinylpyrrolidine or polyacrylamide or mixtures thereof) and **anti-foamier**

(silicone solutions at 10 to 100%). The insoluble copper compound is added to that mixture and after the solution is homogenized the **stabilizing agent** gel is added which had been previously prepared (24 hours in advance), mixing the powdered stabilizing (xanthan gum or gar gum or hydromethylcellulose or mixtures thereof) with the preserving agent (formaldehyde solution 38% or methyl or propyl parahydroxibenzoate or 2-bromo-2-nitro-propane-1,3-diol or sodium benzoate or glutaraldehyde or benzoisotiazolinones) in water.

One example of formulation for one litter of water insoluble copper compound suspension with the respective preparation mode is described below:

Example of formulation:

In one stirred flask add 155 g of water, 20 g of dispersing agent, 30 g of moistening agent, 30 g of antifreeze agent, and 5 g of anti-foamier. This mixture must be held under continuous stirring for 20 minutes. After this time, 5 g of adhesive is added and the mixture must be stirred for 30 more minutes. The tense-active mixture is ready to receive 100 to 850 g of insoluble copper compound (copper hydroxide or copper oxychloride, or cupric oxide or cuprous oxide or tribasic copper sulfate or any other water insoluble copper compounds or mixtures thereof). After addition of the copper compounds, the product must be stirred /dispersed for one hour. To put into final form, the gel of stabilizing agent with preserver is added to the product and one more hour of stirring is required for perfect homogenizing.

CLAIMS

1. COMPOSITION FOR OBTAINING STABLE CONCENTRATED
SUSPENSION OF WATER INSOLUBLE COPPER COMPOUNDS AND
5 METHOD FOR PREPARATION THEREOF, comprising (a) 10-85% m/m of
copper compounds (such as copper hydroxide, cupric oxide, cuprous oxide,
tribasic copper sulfate or any other water insoluble copper compounds or
mixtures thereof); (b) water; (c) adhesive (precipitated silica, polyvinyl alcohol,
polyvinylpyrrolidine, polyacrylamide or mixtures thereof); (d) antifreeze agent
10 (ethylene glycol, propylene glycol, ethylene or mixtures thereof); (e) anti-
foamier agent (10 to 100% silicone solutions); (f) dispersing agent (condensate
ethylene/ propylene oxide groups, alkyl-, aryl- and alkyryl- ethoxylate,
lignosulphonate condensate formaldehyde or mixtures thereof); (g) stabilizig
agent (gel 1% to 2.0% m/m of xanthic gum, gar gum, hydroxymethylcellulose or
15 mixtures thereof); (h) preserving agent (formaldehyde solution 38%, methyl- or
propyl- parahydroxibenzoate, 2-bromo-2-nitro-propane-1,3-diol, sodium
benzoate, glutaraldehyde, benzoisotiazolinones) and (i) moistening agents
(condensate naphthalene -formaldehyde, sulphonate naphthalene- formaldehyde,
polycarboxilates or mixtures thereof).

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2. Method for preparing the composition described in claim 1 comprising the
preparation of a homogenous mixture of the ingredients **b, c, d, e, f** and **j**, to
which the ingredient **a** is added, homogenizing of the mixture is performed and
then the gel of stabilizig agent is added, which must be previously prepared
25 (twenty-four hours in advance), based on the mixtures of the ingredients **g** and **h**.