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- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

(54) Title: NOVEL ORGANO METALO COMPOSITION FOR AGRICULTURE APPLICATION

(57) Abstract: The present invention discloses organometalo composition which comprises Zinc octoate and copper octoate along with other organometalo compounds having antimicrobial and antioxidant property, wherein, the metal concentration is in the range of 0.5 to 25 % and the organic molecules concentration in the range of 75 to 99.5 % for agricultural and non-agricultural applications.



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“NOVEL ORGANO METALO COMPOSITION FOR AGRICULTURE APPLICATION”

TECHNICAL FIELD OF THE INVENTION:

The present invention relates to a composition comprising a novel combination of Organometalo compounds with specific antimicrobial and antioxidant property for agricultural and non-agricultural applications. More particularly, the present invention relates to organometalo composition comprising Zinc octoate and copper octoates with ratio of metal to organic compound to be 0.05 to 99.05 %.

BACKGROUND AND PRIOR ART OF THE INVENTION:

Earlier organo metal complexes such as zinc octoates are reported to be used as hydrogen sulfide scavengers. Petroleum asphalt is produced as a residue of a thermal separation refinery process as per the teachings of European Patent Publication No. 0121377 and 000 421 683 A1.

US5000835 describes use of oil soluble metal carboxylates as hydrogen sulphide scavengers. This patent describes the reaction between H_2S and metal carboxylates with 6 to 24 carbon atoms. In these metal carboxylates, the carbonyl group functions as a carrier for the oppositely charged metal and places the metal into a form which is soluble in an organic environment and able to make contact with dissolved hydrogen sulfide. When the metal in the metal carboxylates reacts with dissolved hydrogen sulfide, the two forms an insoluble metal sulfide, which eliminates the toxic and corrosive properties of the hydrogen sulfide.

The organo metallic complexes of Arsenic, Antimony and Bismuth reported to be used as pesticides from early 60's (Agricultural and Biocidal Applications of Organometalics. Richard J. Daum. M&T Chemicals, Inc., Research laboratory, Rahway, N.J).

SUMMARY OF THE INVENTION:

The present invention discloses a organometalo composition comprising novel combination of organo metal compounds having antimicrobial and antioxidant

property for agriculture and non-agriculture applications with a specific ratio of metal to organic molecules.

In a preferred aspect, the organometalo composition of the present invention comprises Zinc octoate and copper octoates wherein, the ratio of metal to organic compound ranging from 0.05 to 99.05.

DESCRIPTION OF DRAWINGS:

Figure 1 shows 3M (enterobactereaceae) plates test for various pronos initially.

Figure 2 shows 3M (enterobactereaceae) plates test for various pronos after 24 hrs.

Figure 3 shows 3M (enterobactereaceae) plates test for various pronos after 48 hrs.

DETAILED DESCRIPTION OF INVENTION:

The invention will now be described in detail in connection with certain preferred and optional embodiments, so that various aspects thereof may be fully understood and appreciated.

Accordingly, the present invention provides a composition comprising novel combination of one or more organometalo compounds with specific antimicrobial and antioxidant property for agricultural and non-agricultural applications.

In a specific embodiment, the organometalo compounds of the present invention comprises Zinc octoate and copper octoates with a ratio of metal to organic compound ranging from 0.05 to 99.05.

Accordingly, the organometalo composition of the present invention comprises Zinc octoate and copper octoate along with other organometalo compounds having antimicrobial and antioxidant property, wherein, the metal concentration is preferably in the range of 0.5 to 25 % and the organic molecules concentration in the range of 75 to 99.5 %, for agricultural and non-agricultural applications.

In one preferred embodiment the organometalo composition comprising Zinc octoate and copper octoates in a ratio of 1:1.

In another embodiment, the other organometalo compounds are selected from the group consisting of silicates, phosphate/phosphites and benzoates of Zinc and copper.

In another preferred embodiment, the oragnometalo composition optionally comprises trace metals selected from iron, manganese, magnesium, ammonium, calcium, potassium, boron, molybdenum; non-metals such as nitrogen, phosphorous, sulphur and organic moieties such as acetates, propionates, benzoates, gallates etc, to improve plant resistance to reduce plant efficacy disorders or symptoms thereof mediated by such metallo enzymes.

Accordingly, in another preferred embodiment, the present invention provides a composition of Zinc and Copper octoates optionally with Iron and Manganese to activate Super Oxide Dismutase-(SOD) thereby providing methods of treating diseases, disorders or symptoms thereof mediated by such metallo enzymes.

In another preferred embodiment, the present invention provides a composition of Zinc and Copper octoates optionally with Benzoates, acetates, gallates and propionates of metals to improve plant resistance to reduce plant efficacy disorders or symptoms thereof mediated by such metallo enzymes.

In yet another preferred embodiment, the present invention provides a composition of Zinc and Copper octoates alongwith silicates and Phosphates/phosphites.

Accordingly, in another preferred embodiment, the present invention provides the composition of Zinc and Copper octoates with silicates and Phosphates with Silicates: Phosphates: octoates having ratios of 5:3:2 to improve plant resistance to disorders or symptoms thereof.

In another embodiment, the composition of the present invention comprises the combination of Zinc and copper silicates, Phosphites and octoates in the ratio of 5: 3:2 to improve plant resistance to disorders or symptoms thereof.

In yet another embodiment, the composition of the present invention the combination of Zinc and copper silicates, Phosphates, phosphites and octoates in the ratio of 5: 1.5: 1.5: 2 to improve plant resistance to disorders or symptoms thereof.

In a further embodiment, the composition comprises the combination of Zinc and copper silicates, Phosphates, octoates and benzoates in the ratio of 5: 3: 1: 1 to improve plant resistance to disorders or symptoms thereof.

In yet another embodiment, the present invention has demonstrated the anti-microbial property of the organometalo compositions of the present invention. The use of copper and zinc octoates even in 10% in the composition also effectively inhibits the growth of the mycobacterium enterobacteria and E-coli, as shown in table 3 and figures 1 to 3, indicating that the claimed compositions can be used as foliar application for the treatment of bacterial and fungal diseases from the plants.

Other features and embodiments of the invention will become apparent by the following examples which are given only for the purpose of illustration of the invention rather than limiting its intended scope. Various changes and modifications to the disclosed embodiments will be apparent to those skilled in the art.

EXAMPLES

Example-1:

Organometalo compositions comprising Zinc and Copper Octoates with Metal silicates and Metal phosphates in a specific ratio in 5:3:2 ratio is shown in table 1 below.

Table 1

COMPOSITION	WEIGHT IN G	THEORITICAL %Zn & % Cu
Zinc and Copper silicates in 1:1	50 G	EACH 3 %

Zinc and Copper Phosphates in 1:1	30 G	EACH 6 %
Zinc and Copper Octoates in 1:1	20 G	EACH 2 %

Example-2:

Composition comprising Zinc and Copper Octoates with silicates and Phosphates and with or without Iron and Manganese alongwith specific ratio of Nitrogen, Phosphorous and Potassium having ratios of 5:3:2 and with Trace elements, as shown in table 2, to improve plant resistance to disorders or symptoms thereof.

Table 2

ORGANOMETALLIC COMPOUND ALONG WITH NPK			
s.no	Name of raw material	Chilli	Vegetable grades (brinjal, okra, cabbage, cauliflower, beans,gaurds)
		Chilli flowering 7-3-23	Fruit development and maturity 8-2- 27
		Weight in grams	Weight in grams
1	SILICATES	100	100
2	PHOSPHATES	60	60
3	OCTOATES	40	40
4	UREA	22	50
5	KNO ₃ 13-0-45	511	444
6	SOP 00-00-50(Sulphate of potash)	0	0
7	MAP(Monoammonium phosphate)	0	0
8	MKP(Mono Potassium Phosphate)	0	0

9	Ca- PROPIONATE	33.3	33.3
10	Ca-ACETATE	33.3	33.3
11	Ca-PHOSPHATE (HAP)	33.3	33.3
12	BOROVIN	120	120
13	MgSO4 anhydrous	13	26
14	MnSO4.H2O	28	0
15	FeSO4.7H2O	0	0
16	BORIC ACID	0	0
17	Fe-EDTA	0	10
18	Mn-EDTA	0	40
19	AMMONIUM MOLYBDATE	0	0.02
20	ANTI CAKING	6	10
TOTAL		1000	1000

Example 3:

The anti-microbial property of the organometalo compositions of the present invention is demonstrated in the below table 3 and shown in figures 1 to 3. The use of combination of copper and zinc octoates(1:1) even in 10% in the compositions of copper and zinc (1:1) silicates, phosphates, phosphites and benzoates, effectively inhibits the growth of the enterobacteria and E-coli, when compared to silicates, phosphates, phosphites and benzoates alone or their combinations. Therefore, the combination of copper and zinc octoates (1:1) even in 10% in the compositions of silicates, phosphates, phosphites and benzoates effectively inhibits the growth of the enterobacteria and E-coli, when compared to the compositions that are devoid of octoates as demonstrated in table 3 below.

Table 3:

3M (ENTEROBACTEREACEAE) PLATES TEST FOR VARIOUS PRONOS

S.NO	DESCRIPTION with Ratios of SILICATES-PHOSPHATES- OCTOATES	DILUTION FOR 3 M	% of Anti microbial property
1	50-30-20 SILICATES- PHOSPHATES- OCTOATES(PRONOS-1)	1G/LIT	100 %
2	50-30-20 SILICATES-PHOSPHITES –OCTOATES(PRONOS-2)	1G/LIT	100 %
3	50-15-15-20 SILICATES- PHOSPHATES-PHOSPHITES- OCTOATES(PRONOS-3)	1G/LIT	100 %
4	50-30-20 SILICATES- PHOSPHATES- BENZOATES(PRONOS-4)	1G/LIT	90 %
5	50-30-10-10 SILICATES- PHOSPHATES-OCTOATES- BENZOATES(PRONOS-5)	1G/LIT	100 %
6	COPPER AND ZINC SILICATES -50- 50 (1:1)	1G/LIT	80%
7	COPPER AND ZINC PHOSPHATES- 50-50 (1:1)	1G/LIT	NIL
8	COPPER AND ZINC PHOSPHITES- 50-50 (1:1)	1G/LIT	NIL
9.	COPPER AND ZINC BENZOATES - 50-50 (1:1)	1G/LIT	80%
10.	COPPER OCTOATE-100	1G/LIT	70%
11.	ZINC OCTOATE-100	1G/LIT	60%
12	COPPER AND ZINC OCTOATE-50- 50 (1:1)	1G/LIT	100%

Procedure:

Various formulation(Pronos) as referred above in table 3 was prepared by dissolving 1gm of the formulation in one litre of contaminated water containing Ecoli or Enterobactereacea. The samples were placed on the 3M plates(3M Petrifilm Enterobacteriaceae Count Plate) and incubated all the plates for 24 hours period. After 24 hours a clear indication of Anti-Microbial property was observed from the color change in the 3M paltes.

Each 3M –Plate have self-indicated with selected Media for Ecoli and Entero bacteacea. These 3M Petrifilm Enterobacteriaceae Count Plate is a sample-ready-culture medium system that contains modified Violet Red Bile Glucose (VRBG) nutrients, a cold-watersoluble gelling agent, and a tetrazolium indicator that facilitates colony enumeration. 3M Petrifilm Enterobacteriaceae Count Plates are used for the enumeration of Enterobacteriaceae in the food, beverage and bottled water industries. Enterobacteriaceae are oxidase-negative, Gram-negative rods that ferment glucose to produce acid and/or gas. Enterobacteriaceae colonies will appear as red colonies associated with yellow zones, red colonies associated with gas bubbles, red colonies associated with yellow zones and with gas bubbles (source: 3M Petrifilm™).

Color Indication plate for Microbial species:

3M-Plate-Violet color for Entero Bactreacea

3-M Plate-Pink color for E-COLI

As the count of the Enterobacteriaceae increases, the color of the gel lightens from violet to yellow or cream colored. Similarly, As the count of the e-coli increases, the color of the gel lightens from dark pink to light pink colored.

Results:

Above all formulations containing copper and zinc octoate(1:1) gives clear indication of 100 % Anti microbial property against Enterobacteriaceae and E. Coli.

Based on the above results the claimed compositions can be used as foliar application in agriculture fields for the treatment of bacterial and fungal diseases from the plants like phytopathogens are tested and found its controlled.

Example 4:

Example 4, illustrates various formulation prepared using octoates of zinc and copper along with phosphates, silicates, benzoates, propionates and NPK, for agricultural applications as provided under tables 4 to 10.

Table 4

DATE	19-1-2018			
SAMPLE NO	COMPOSITION	PER ACRE DOSE		
SAMPLE-1		1-A	1-B	
	zinc Octonate	0.5 G	1 G	
	copper Octonate	0.5 G	1 G	
SAMPLE-2		2-A	2-B	
	copper Octonate	1 G	2 G	
SAMPLE-3	(CS+CP)=100 g/Acre with copper Octonate 1 g			
SAMPLE-4	(CS+CP)=200 g/Acre with copper Octonate 1 g			
SAMPLE-5	(CS+CP)=100 g/Acre with zinc Octonate 1 g			
SAMPLE-6	(CS+CP)=200 g/Acre with zinc Octonate 1 g			
SAMPLE-7	zinc phosphate + zinc silicate = 100 g/acre			
SAMPLE-8	zinc phosphate + zinc silicate = 200 g/acre			
SAMPLE-9		9-A	9-B	9-C
	CS+ZS	50 g	50 g	125 g
	CP+ZP	50 g	50 g	75 g
	copper Octonate	0.5 g	1 g	0.5 g
	zinc Octonate	0.5 g	1 g	0.5 g
SAMPLE-10	CS+CP (1:1)			
SAMPLE-11	SUCROSE Octonate LIQUID	Insect & Microbes		

CP: Calcium Phosphate; ZP: Zinc phosphate; ZS: Zinc silicate; CS: Calcium silicate

Table 5:

Various combinations of copper and zinc silicates, phosphates and octoates are prepared and provided below as samples 12 to 15 as above in table 5.

DATE 02-02-2018					
	1:1 silicates	1:1 phosphates	Zn- Octonate	Cu- Octonate	Sample weight
SAMPLE-12 60-40-10	2.72	1.82	0.46	0	5 G
SAMPLE-13 60-40-10	2.72	1.82	0	0.46	5 G
SAMPLE-14 50-30-20	2.5	1.5	1	0	5 G
SAMPLE-15 50-30-20	2.5	1.5	0	1	5 G

Table 6:

Table 6 shows various combinations of Zn and Cu Octoates along with P₂O₅.

CONTENTS				
Sample code	% Zn	% Cu	% P₂O₅	% Zn+Cu Octoates
sample-1	11	10	0	100
sample-2	0	20	0	100
sample-3	0	26.2	18	0+1
sample-4	0	26.1	18	0+1
sample-5	0.2	26	18	1+0
sample-6	0.1	26	18	0.5+0
sample-7	26	0	18	0
sample-9A	13.1	13.1	18	0.5+0.5
sample-9B	13.2	13.2	18	1+1
sample-9C	11	11	13.5	0.25+0.25
sample-10	0	26	18	0
sample-11				100
sample-12	12.54	10.54	13	9+0

sample-13	10.54	12.54	13	0+9
sample-14	13.4	9	10.8	20+0
sample-15	9	13.4	10.8	0+20
sample-1(1:1 Zn Octoate + Copper Octoate)	11	10	0	
sample-2 (Copper Octoate)	0	20	0	
SAMPLE-16 (60-40-10)	10.54	12.54	13	0.9+0.9
SAMPLE-17 (50-30-20)	9	9	10.8	1.8+1.8

Table 7: Table 7 shows various combinations of Zn and Cu silicates, phosphates and Octoates.

	1:1 silicates	1:1 phosphates	Zn- Octoate	Cu- Octoate	Sample weight
sample-1 (1:1 Zn Octoate + Copper Octoate)	0	0	50	50	100
sample-2 (Copper Octoate)	0	0	0	100	100
SAMPLE-16 (60-40-10)	54.4	36.4	4.6	4.6	100
SAMPLE-17 (50-30-20)	50	30	10	10	100

Table 8:

Table 8 shows various compositions of zinc octoate, copper octoate without Zinc/copper Phosphate and Zinc/copper Silicates either alone or in combination thereof.

	PER ACRE DOSE			
S NO	Composition	1-A	1-B	
Sample -1	Zinc Octoate	0.5 gm	1 gm	
	Copper Octoate	0.5 gm	1 gm	
		2-A	2-B	
Sample -2	Copper Octoate	1 gm	2 gm	
Sample -3	(CS + CP) = 100 gm / acre with Copper Octoate 1 gm			
Sample -4	(CS + CP) = 200 gm / acre with Copper Octoate 1 gm			
Sample -5	(CS + CP) = 100 gm / acre with Zinc Octoate 1 gm			
Sample -6	(CS + CP) = 200 gm / acre with Zinc Octoate 1 gm			
Sample -7	Zinc Phosphate + Zinc Silicate=100 gm / acre			
Sample -8	Zinc Phosphate + Zinc Silicate=200 gm / acre			
		9-A	9-B	9-C

Sample -9	CS/ ZS	50 gm	50 gm	125gm
	CP/ ZP	50 gm	50 gm	75 gm
	Copper Octoate	0.5 gm	1 gm	0.5 gm
	Zinc Octoate	0.5 gm	1 gm	0.5 gm
Sample -10	CS+CP(1:1)			
Sample -11	Sucrose Octoate	Insect & Microbe s		

Table 9

Table 9 discloses a composition containing pronos 1 to 3 along with other agricultural ingredients with Stevia extract.

DORMULIN-3 VEGETATIVE WITH BIO FILM BREAKERS + STEVIA EXTRCT		
S.NO	RAW MATERIAL	Qty/MT
1	Pronos -1	100
2	Pronos-2	60
3	Pronos-3	40
4	MgSO ₄ .H ₂ O	110
5	MnSO ₄ .H ₂ O	100
6	FeSO ₄ .7H ₂ O	50
7	AMMONIUM MOLYBDATE	5

8	FULVIC ACID	200
9	UREA	30
10	Roxite	100
11	SOP	100
12	BOROVIN	12
13	STEVIA EXT-CHLOROFORM	1 ML
14	STICKING AGENT(JEEMOX)	3
15	DISPERSANT(JEEMOL DW)	90
16	TOTAL WEIGHT	1000

Table 10: DORMULIN-3 FLOWERING VARIANTS

		2. stevia extract	3. KOH & urea	4. Pot.benzoate & Pot.peroxy mono sulfate	5. Calcium thio sulfate
S.NO	RAW MATERIAL	Qty IN G	Qty IN G	Qty IN G	Qty IN G
1	Pronos -1	100	100	100	100
2	Pronos-2	60	60	60	60
3	Pronos-3	40	40	40	40
4	Calcium ACETATE	50	50	50	50
5	AMMONIUM MOLYBDATE	5	5	5	5
6	FULVIC ACID	250	250	250	250
7	calcium propionate	50	50	50	50
8	SOP	200	0	0	199

9	KOH FLAKES	0	100	0	0
10	BOROVIN	120	120	120	120
11	UREA	0	100	0	0
12	10 % STEVIA EXT- CHLOROFORM	1 ML		1 ML	1 ML
13	POTASSIUM BENZOATE			100	0
14	POTASSIUM PEROXY MONO SULFATE			100	0
15	CALCIUM THIOSULFATE				1
16	STICKING AGENT(JEEMOX)	0	0	0	0
17	DISPERSANT(JEEM OL DW)	120	120	120	120
18	Jeesperse	5	5	5	5
	TOTAL WEIGHT	1000	1000	1000	1000

We claim,

1. Organometalo composition comprising Zinc octoate and copper octoate along with other organometalo compounds having antimicrobial and antioxidant property, wherein, the metal concentration is in the range of 0.5 to 25 % and the organic molecules concentration in the range of 75 to 99.5 % for agricultural and non-agricultural applications.
2. The oragnometalo composition as claimed in claim 1, wherein, the Zinc octoate and copper octoates is in a ratio of 1:1, to improve plant resistance to disorders or symptoms thereof.
3. The oragnometalo composition as claimed in claim 1, wherein, the composition optionally comprises trace metals selected from iron, manganese, magnesium, ammonium, calcium, potassium, boron, molybdenum; non-metals such as nitrogen, phosphorous, sulphur and organic moieties such as acetates, propionates, benzoates, etc, to improve plant resistance to reduce plant efficacy disorders or symptoms thereof mediated by such metallo enzymes.
4. The composition as claimed in claim 1, wherein, the other organometalo compounds are selected from the group consisting of silicates, phosphate/phosphites and benzoates of Zinc and copper.
5. The composition as claimed in claim 4, wherein, the composition comprises the combination of Zinc and copper silicates, Phosphates and octoates in the ratio of 5: 3:2 to improve plant resistance to disorders or symptoms thereof.
6. The composition as claimed in claim 4, wherein, the composition comprises the combination of Zinc and copper silicates, Phosphites and octoates in the ratio of 5: 3:2 to improve plant resistance to disorders or symptoms thereof.
7. The composition as claimed in claim 4, wherein, the composition comprises the combination of Zinc and copper silicates, Phosphates, phosphites and octoates in the ratio of 5: 1.5: 1.5: 2 to improve plant resistance to disorders or symptoms thereof.

8. The composition as claimed in claim 4, wherein, the composition comprises the combination of Zinc and copper silicates, Phosphates, octoates and benzoates in the ratio of 5: 3: 1: 1 to improve plant resistance to disorders or symptoms thereof.

I/III

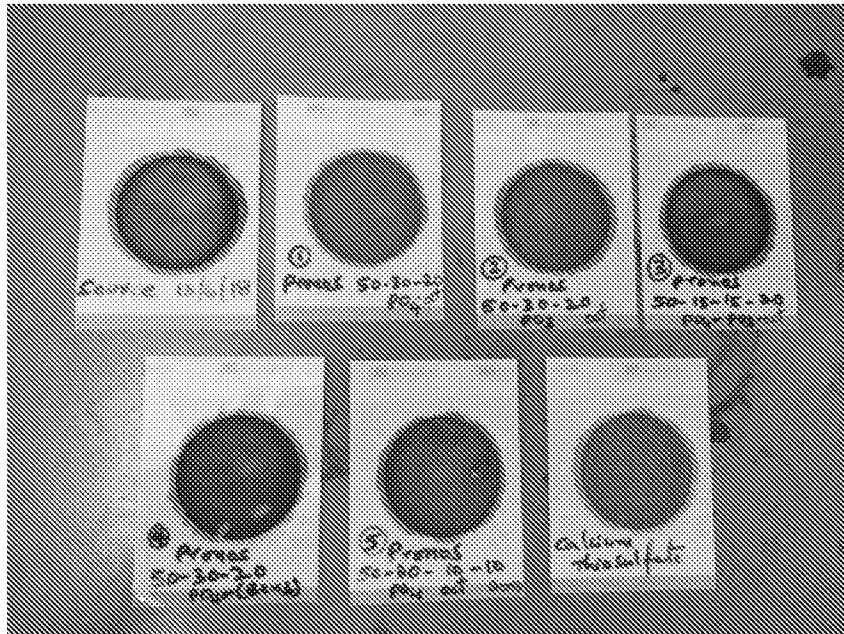


Figure 1

II/III

PHOTOS AFTER 24 HRS:

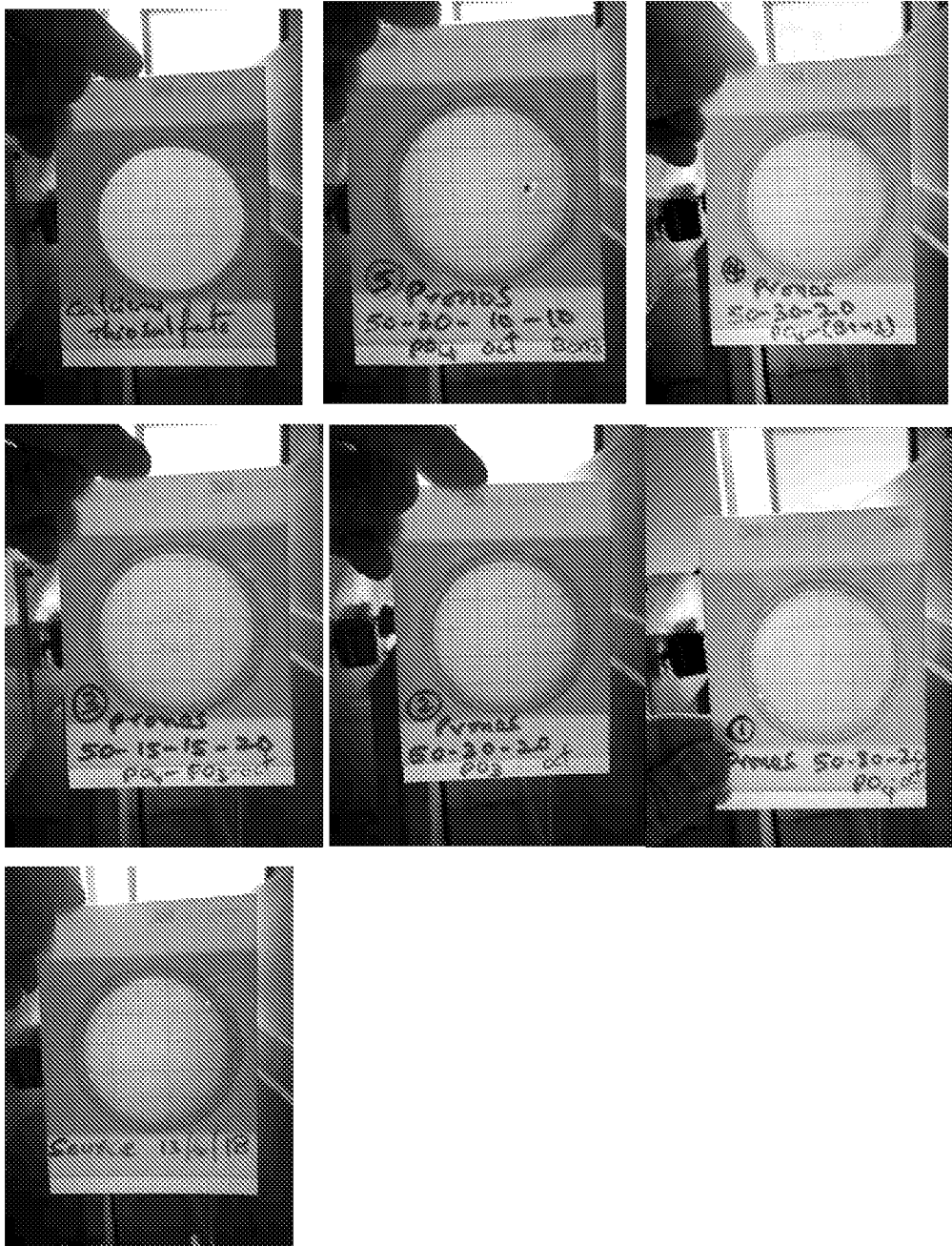


Figure 2

III/III

PHOTOS AFTER 48 HRS:

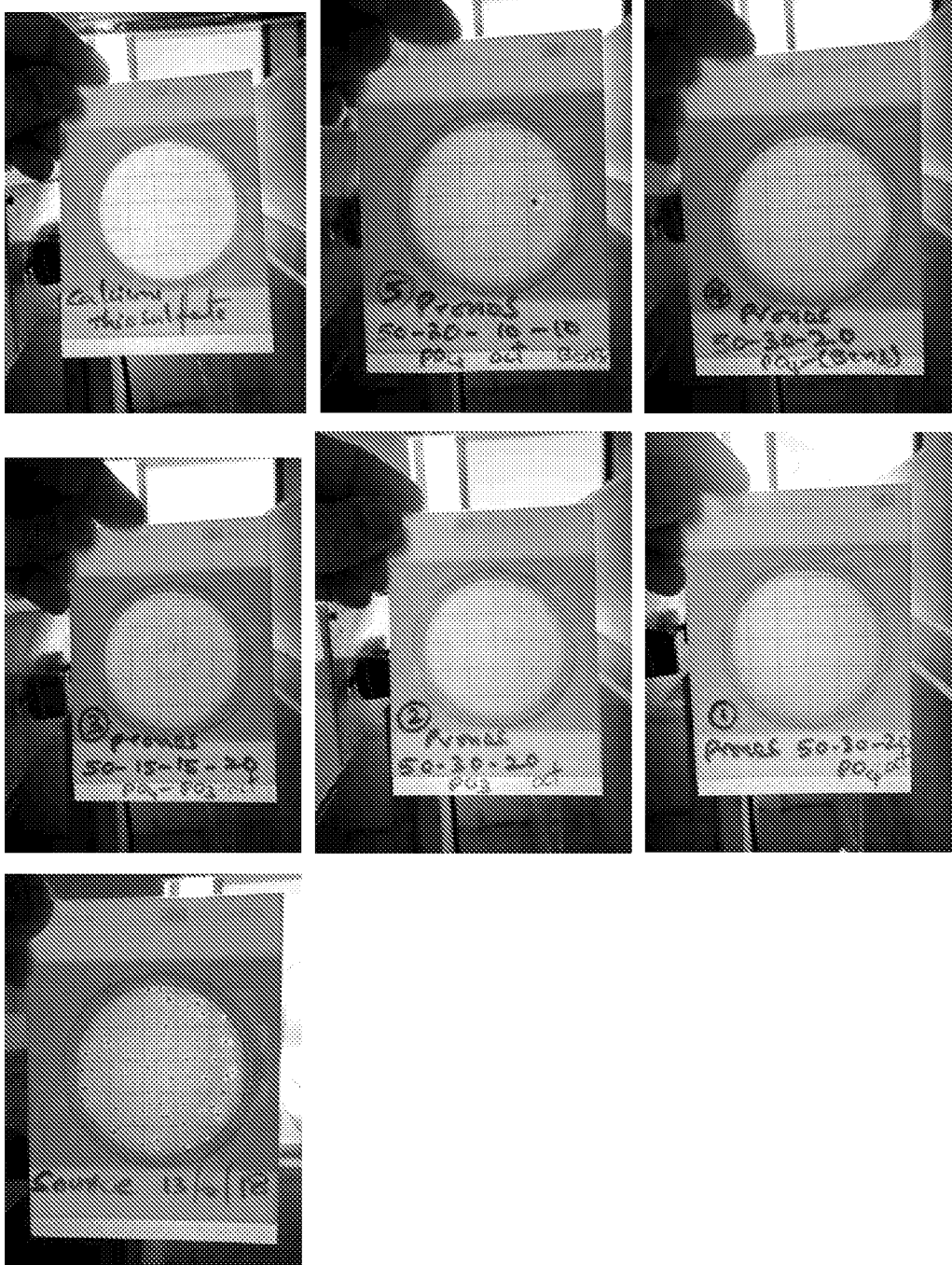


Figure 3

INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A01N25/10, A61K33/30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

TotalPatent One, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO2017121019A1, JIANGSU HUIFENG AGROCHEMICAL CO LTD [CN], 20 July 2017 (20/07/2017) entire document	1-8
A	EP2870200A1, 3M INNOVATIVE PROPERTIES CO [US], 13 May 2015, (13/05/2015) entire document	1-8

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT
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Citation	Pub.Date	Family	Pub.Date
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