

INSTRUCTIONS

(a) If Convention application insert "Convention"

(a) CONVENTION

AUSTRALIA

Patents Act 1990

654332

(b) Delete one

REQUEST FOR A (b) STANDARD/~~PETTY~~ PATENT

(c) Insert FULL name(s) of applicant(s)

XI/We being the person(s) identified below as the Applicant, request the grant of a patent to the person identified below as the Nominated Person, for an invention described in the accompanying Standard/~~Petty~~ (b) Complete Patent Specification.

~~XII~~/We are (b) ~~not~~ an opponent or eligible person described in Sections 33-36 of the Act.

[70,71] Applicant and Nominated Person (c): DIVERSEY CORPORATION

(d) Insert FULL address(es) of applicant(s)

of (d) 201 City Centre Drive, Mississauga, Ontario L5B 2Z9, Canada

(e) Insert TITLE of invention

[54] Invention Title (e) ANADIAMIDE FORMALDEHYDE PAINT DETACKIFIER

(f) Insert Names of Actual Inventors.

[72] Names of Actual Inventors (f)

Charles Ficker

[74] Address for Service:

PHILLIPS ORMONDE AND FITZPATRICK
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367 Collins Street
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Attorney Code: PO

(Note: The following applies only to Convention applications)

Basic Convention Application Details

(p) Insert number, country and filing date for the/or each basic application

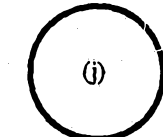
(g)	[31] Application No.	[33] Country	Country Code	[32] Date of Application
	670,051	US	US	March 15/91
		United States of America		

(h) Signature of applicant(s) (For body corporate see headnote*)

(i) Insert date of signing

(j) Corporate seal if any

Note: No legalization or other witness required



(h) Signature of Applicant

(i) Date

2 March 1992

PHILLIPS ORMONDE AND FITZPATRICK
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AUSTRALIA

Patents Act 1990

NOTICE OF ENTITLEMENT

INSTRUCTIONS

(a) Name of person making statement.

(b) Position of that person.

(c) Name of applicant

(d) Address of applicant

(e) Delete as necessary

(f) Insert details if not covered by (i) or (ii)

(g) Delete as necessary

(h) Delete for non-convention applications

(i) Insert DATE of signing

(j) Signature(s) of person making statement

I(a) Eric C. Trimble

(b) Vice President and Secretary

of (c) Diversey Corporation

of (d) 201 City Centre Drive,
Mississauga, Ontario L5B 2Z9

State the following:-

1. The nominated person (applicant) is entitled to the grant of a patent

(e) ~~(i) as assignee of the actual invention(s)~~

~~xx(ii)xx by contract of employment of the actual inventor(s)~~

or (iii) (f) inventors assigned to DuBois Chemicals and from DuBois Chemicals to Diversey Corporation

2. The nominated person (applicant) is entitled to claim priority from the basic convention application(s).

(g) (i) ~~as applicants of the said application(s)~~

(ii) as the assignee of the applicants of the said application(s)

~~xx(iii)xx with the consent of the applicants of the said application(s)~~

3. The basic convention application(s) was/were the first made in a Convention country in respect of the invention the subject of the application. (h)

Dated (i)

2 March 1992

(j)

Eric C. Trimble, Vice President
and Secretary

Note: No legalization or other witness required

To: The Commissioner of Patents

PHILLIPS ORMONDE AND FITZPATRICK
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(12) PATENT ABRIDGMENT (11) Document No. AU-B-12872/92
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 654332

- (54) Title
DICYNADIAMIDE FORMALDEHYDE PAINT DETACKIFIER
- (51)⁵ International Patent Classification(s)
C08K 003/10 C08L 061/32
- (21) Application No. : **12872/92** (22) Application Date : **12.03.92**
- (30) Priority Data
- (31) Number (32) Date (33) Country
670051 15.03.91 US UNITED STATES OF AMERICA
- (43) Publication Date : **17.09.92**
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- (71) Applicant(s)
DIVERSEY CORPORATION
- (72) Inventor(s)
CHARLES FICKER
- (74) Attorney or Agent
PHILLIPS ORMONDE & FITZPATRICK , 367 Collins Street, MELBOURNE VIC 3000
- (56) Prior Art Documents
US 4800039
US 4067806
US 3861887
- (57) Claim

1. A method of detackifying paint overspray contained in water in a paint booth comprising adjusting the pH of said water to 7 to 10, adding a paint detackification composition including a polymer and an aluminum salt selected from the group consisting of aluminum sulfate, aluminum chloride and aluminum chlorohydrate in an amount effective to detackify overspray in said water wherein said polymer is the condensation product of dicyanadiamide and formaldehyde wherein the ratio of polymer to aluminum salts from 22.5:1 to 1:4; and wherein the concentration of polymer added to said water is from 95 to 800 ppm.

8. A method of detackifying paint overspray contained in water in a paint booth comprising adding to said water a paint detackification composition including from 95 to 800 parts per million of a dicyanadiamide formaldehyde copolymer having a molecular weight of from 1,000 to 200,000 and aluminum chlorohydrate wherein the ratio of said polymer to said aluminum chlorohydrate is from 22.5:1 to 1:4 and adjusting the pH of said water to 9 to 10 and collecting detackified paint and removing said detackified paint from said water.

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9. A method of detackifying paint overspray contained in water in a paint spray booth system comprising:

- (a) adding to said water a paint detackification composition comprising a dicyanadiamide formaldehyde copolymer having a molecular weight from 1,000 to 200,000 and a water soluble aluminum metal salt wherein the ratio of said copolymer to said aluminum metal salt is from 22.5:1 to 1:4;
- (b) adjusting the pH of said water to 7 to 10 and collecting detackified paint; and
- (c) removing said detackified paint from said water.

AUSTRALIA

Patents Act

COMPLETE SPECIFICATION
(ORIGINAL)

Class

Int. Class

Application Number:
Lodged:

Complete Specification Lodged:
Accepted:
Published:

654332

Priority

Related Art:

Name of Applicant:

Diversey Corporation

Actual Inventor(s):

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Invention Title:

DICYANADIAMIDE FORMALDEHYDE PAINT DETACKIFIER

Our Ref : 282198

POF Code: 1649/46171

The following statement is a full description of this invention, including
the best method of performing it known to applicant(s):

DICYNADIAMIDE FORMALDEHYDE PAINT DETACKIFIERBackground of the Invention

In a paint booth, the general object is to apply as much of the paint as possible to the articles being painted and minimize overspray. However, there is always a certain amount of overspray even with electrostatic paint sprayers. Generally the overspray is collected by forcing air through the paint spray booth. This causes the overspray to be entrained in the stream of forced air.

The air is passed through some type of water collector, such as a water curtain, which traps particles of paint carried by the air. This prevents the paint particles from being discharged into the atmosphere. Unfortunately, once the paint particles are trapped in a body of water held in a collection basin or tank, they must be removed.

Even though the paint particles are suspended in water, they still tend to be tacky. If untreated, they will form as a sludge and attach to the walls and base of the holding tank. When sufficient amounts are built up, they must be cleaned. Cleaning the tank can be very expensive and time consuming.

To overcome this, the paint particles are treated with various compositions and agents to in effect detackify the particles preventing them from sticking together to form a sludge. This also prevents them from sticking to the walls of the holding tank. These compositions and mixtures are all generally added to the water used to trap and hold the paint particles.

As an example, Mauceri U.S. Patent No. 4,067,806 describes a cationic terpolymer of dialkyldimethyl ammonium halide, N-vinyl-2-pyrrolidoneacrylamide and the salt of an amphoteric metal as a paint detackification product.

Forney U.S. Patent No. 3,861,887 discloses a blend of polycationic water dispersible polymer and a water

dispersible salt of an amphoteric metal such as zinc chloride, iron chloride, lanthanum chloride or aluminum chloride.

Leitz U.S. Patent No. 4,629,572 discloses the use of
5 condensation resins of aldehyde and nitrogenous compounds
such as urea, melamine, thiourea, quinidine,
dicyanadiamide, substituted melamine and others in
combination with clay. Many other patents disclose the
use of clay itself or clay in combination with other
10 polymers as a detackification agent for paint spray
booths.

Any system that employs clay presents an inherent
disadvantage since the clay itself significantly
increases the amount of waste material that must be
15 discarded. Since the paint material must be treated as a
hazardous waste, it is expensive to dispose. Any system
that employs clay significantly increases this cost.

Other patents which disclose various treatment
compositions which rely on clay, multivalent metal
20 compositions and polymers include Mizuno U.S. Patent No.
4,656,059, Renner U.S. Patent No. 3,716,483, Harpel U.S.
Patent No. 4,504,395, Sellet U.S. Patent No. 3,498,913,
Gabel U.S. Patent No. 4,055,495, and Arnold U.S. Patent
No. 3,515,575.

25 Generally, in addition to waste problems, many of
these polymeric compositions are ineffective and
particularly are not effective over a wide range of paint
compositions. Further, with various compositions, there
is a significant cost due to the concentration of the
polymer required.
30

Summary of the Invention

The present invention is premised on the realization
that a combination of a copolymer of a dicyanadiamide and
formaldehyde along with a water soluble multivalent metal
35 salt, particularly an aluminum salt, such as aluminum
chlorohydrate is an effective paint detackification
product for a wide variety of different paints.

The present invention is further premised on the realization that the dicyanadiamide formaldehyde copolymer in combination with aluminum chlorohydrate
5 can be used at relatively low levels to detackify paint and without significantly increasing the weight of waste product produced thereby avoiding significant expense.

The present invention is further premised on the realization that dicyanadiamide formaldehyde copolymer in combination with aluminum chlorohydrate acts to effectively
10 detackify oil based paints as well as water based paints at alkaline pHs. The present invention is in fact effective to detackify both types of paints at the same time in the same paint spray booth.

The objects and advantages of the present invention will be further appreciated
15 in light of the following detailed description.

In one embodiment, the present invention provides a method of detackifying paint overspray contained in water in a paint booth characterised in that it comprises adjusting the pH of the said water to from 7 to 10, adding a paint detackification
20 composition comprising a polymer and an aluminum salt selected from aluminum sulfate, aluminum chloride and aluminum chlorohydrate in an amount effective to detackifying overspray in the said water, the said polymer being a condensation product of dicyanadiamide and formaldehyde wherein the ratio of polymer:aluminum salt is from 22.5:1 to 1:4 and the concentration of polymer added to the said water being from 95 to
25 800 ppm.

In another embodiment, the present invention provides a method of detackifying paint overspray contained in water in a paint booth characterised in that it comprises adding to the said water a paint detackification composition comprising from 95 to 800
30 ppm of a dicyanadiamide formaldehyde copolymer having a molecular weight of from 1,000 to 200,000 and aluminum chlorohydrate wherein the ratio of the said polymer: the said aluminum chlorohydrate is from 22.5:1 to 1:4, adjusting the pH of the said water to from 9 to 10, collecting detackified paint and removing the said detackified paint from the said water.



In a further embodiment, the present invention provides a method of detackifying paint overspray contained in water in a paint spray booth system characterised in that it comprises:

(a) adding to the said water a paint detackification composition comprising a dicyanadiamide formaldehyde copolymer having a molecular weight from 1000 to 200,000 and a water-soluble aluminum metal salt wherein the ratio of the said copolymer the said aluminum metal salt is from 22.5:1 to 1:4;

(b) adjusting the pH of the said water to from 7 to 10 and collecting detackified paint; and

(c) removing the said detackifying paint from the said water.

A paint detackification system for use in the present invention includes a carbamide polymer and multivalent metal salt. The polymer is the condensation product of dicyandiamide (also referred to as cyanoquanidine) and formaldehyde. The formaldehyde amino condensation reaction is a well known reaction which is conducted under acidic conditions. Basically equimolar amounts of dicyanadiamide and formaldehyde are reacted to form this polymer.

For use in the present invention, the copolymer must be water dispersible and should be water soluble. Generally such polymers will have a molecular weight of 1000 to 200,000 and generally less than 100,000.

The presently preferred polymer is Suntech 6253® purchased from Surfactant Technologies, 328 West 11th Street, Riviera Beach, Florida. This is purchased as a 48-52% active solution in water having a specific gravity of 1.17-1.20. It generally has a pH of about 3.5-4.2.

The multivalent metal salt can be a salt of aluminum, iron, magnesium, calcium,



nickel, copper, tin, barium, strontium or zinc. Specific salts include calcium chloride, calcium sulfate, aluminum sulfate, aluminum chloride and aluminum chlorohydrate. The aluminum salts are most effective in the present system and aluminum chlorohydrate is most preferred due to its effectiveness and versatility.

Aluminum chlorohydrate is also referred to as a aluminum hydroxylchloride, aluminum chloridehydroxide and aluminum chlorohydroxide. The commercial product is sold as 50% solution containing 23-24% Al_2O_3 and 7.5 to 8.5% Cl. In preparing the paint detackification composition of the present invention, the multivalent metal salt is added to the solution of dicyanadiamide formaldehyde copolymer. The ratio of bivalent metal salt to copolymer will range from 22.5-1 to 1-4 by weight.

The preferred embodiment of the present invention is a combination of aluminum chlorohydrate and dicyanadiamide formaldehyde copolymer. In order to form this, the aluminum chlorohydrate is added to the solution of dicyanadiamide formaldehyde copolymer.

Aluminum chlorohydrate can be purchased as a 50% solution in water from Courtney Industries among others. Generally the concentration of aluminum chlorohydrate in the solution of dicyanadiamide formaldehyde copolymer will be from about 5 to about 22.5% by weight (solids) and preferably 7.5% to 15%. Generally the dicyanadiamide formaldehyde copolymer will comprise 1-50% (actives by weight) of the solution and preferably 10%-20%.

This concentrated solution of polymer and multivalent metal salt is then added to the water system of the paint spray booth. There are many different types of paint spray booths and paint overspray collection systems. However, the particular system forms no part of the present invention.

The water in the overspray collection system is first adjusted to a pH of about 7 to about 10 with about 9 to about 10 being preferred and about 9 to about 9.5 being most preferred. This is done using a suitable buffer such as soda ash or sodium



silicate. Preferably, an aqueous solution of 4% sodium silicate and 12% soda ash is added to the water until a total alkalinity of up to 3000 ppm is achieved.

5

The solution of polymer and multivalent metal salt is then added to the water. On a weight basis, the concentration of polymer should be from about 95 to about 800 ppm with about 400 ppm being preferred. The concentration of multivalent metal salt should be from about 70 to about 600 with about 300 ppm preferred in the water system. Of course, the amount added will vary depending upon the concentration of the solution of polymer and metal salt along with the molecular weight of the polymer.

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If a defoamer is needed, a petroleum based defoamer should be added as needed. One such petroleum based defoamer is Depress Plus® sold by DuBois Chemicals. There are other comparable defoamers on the market which are equally suited for this application.

15

The overspray paint collected in the system and treated with the composition of the present invention can then be collected using various mechanical or chemical collection methods. For example, this can be removed from water using a flocculent such as a higher molecular weight polymer or simply can be physically collected depending on the particular paint which is the overspray and the available equipment. Suitable kick out polymer includes medium to high charge density hydrolyzed polyacrylamide polymers and acrylamide/acrylic acid copolymers such as Floculite 552® and Floculite 402® sold by DuBois Chemicals. These are well known in the industry and generally different polymers will be selected based on the paint being collected and the collection equipment.

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The advantages of the present invention will be further appreciated in light of the following detailed example.

30



Example

5 To test the detackifier of the present invention, a detackifying composition including 10% on an active basis of dicyanadiamide formaldehyde copolymer and 7.5% aluminum chlorohydrate was tested in a six foot, eight inch long Hydrosprin® MK III spray booth with two dynatubes. The sludge removal system was a size 600 Hydropac®. The capacity of the system is 1200 gallons with a water flow rate to the
10 booth of 200 gallons per minute. The waterflow rate to the Hydropac® is 60 gallons per minute. A solution of 4% sodium silicate and 12% soda ash was added until the alkalinity of the system was 3000 ppm total M. The solution of dicyanadiamide formaldehyde aluminum chlorohydrate was added until the concentration of the polymer was about 400 parts per million and the concentration of the aluminum chlorohydrate
15 was about 300 parts per million. During the test, additional detackifier was added to maintain this concentration.

30% (8 US gallons) of a water based PPG brand base clear coat was sprayed using a Binks Brand® 61 air atomized spray gun at 4.83 bar (70 psi) air pressure and
20 30% (8 US gallons) of PPG Brand oil based base coat was sprayed over a period of two hours. During the course of this, 30.24 liters of clear coat were sprayed and 30.24 liters of base coat were sprayed.

Four coupons were positioned in the paint booth to detect stickiness due to the
25 clear coat and due to the base coat. The coupons collected 103.3 milligrams of paint combined. Any number lower than a 120 milligrams is considered to be good. The solids content of the collected sludge was 10.9%. The pain collection efficiency was 96.5 which is considered good. And the

average suspended solids was 176.6. The chemical to paint solids ratio was 0.23:1.

As shown by the example, this detackification composition simultaneously detackifies aqueous and oil based paints at alkaline pHs. This is truly remarkable in light of the fact that generally water based paints are detackified using acid conditions frequently with pHs as low as 4.

The present invention permits these to be removed at alkaline pHs which are less corrosive. Further, there is extreme versatility provided since the same conditions can be used for both oil and water based paints.

Thus the present invention is useful in collecting a variety of different paint compositions. Its use concentration level is significantly lower than other polymeric detackifiers. This versatility and low use concentration is particularly advantageous in today's environment. Further, since there is no clay in this formulation, the amount of waste produced is relatively low. This significantly reduces the cost of using this product.

Although preferred embodiments of the invention are described herein in detail, it will be understood by those skilled in the art that variations may be made thereto without departing from the spirit of the invention or the scope of the appended claims.

The claims defining the invention are as follows:

5 1. A method of detackifying paint overspray contained in water in a paint booth comprising adjusting the pH of said water to 7 to 10, adding a paint detackification composition including a polymer and an aluminum salt selected from the group consisting of aluminum sulfate, aluminum chloride and aluminum chlorohydrate in an amount effective to detackify overspray in said water wherein said polymer is the
10 condensation product of dicyanadiamide and formaldehyde wherein the ratio of polymer to aluminum salt is from 22.5:1 to 1:4; and wherein the concentration of polymer added to said water is from 95 to 800 ppm.

15 2. The method claimed in claim 1 wherein said aluminum salt is aluminum chlorohydrate.

3. The method claimed in claim 2 wherein said polymer has a molecular weight of from 1000 to 200,000.

20 4. The method as claimed in any of claims 1 to 3 wherein alkalinity of said water is up to 3,000 total M.

25 5. The method claimed in claim 2 wherein said paint comprises a water based paint.

6. The method claimed in claim 2 wherein said paint comprises an oil based paint.

7. The method claimed in claim 2 wherein said paint comprises a combination of water based paint and oil based paint.

30 8. A method of detackifying paint overspray contained in water in a paint booth comprising adding to said water a paint detackification composition including from 95 to 800 parts per million of a dicyanadiamide formaldehyde copolymer having a molecular weight of from 1,000 to 200,000 and aluminum chlorohydrate wherein the ratio of said



polymer to said aluminum chlorohydrate is from 22.5:1 to 1:4 and adjusting the pH of
said water to 9 to 10 and collecting detackified paint and removing said detackified
5 paint from said water.

9. A method of detackifying paint overspray contained in water in a paint spray
booth system comprising:

(a) adding to said water a paint detackification composition comprising a
10 dicyanadiamide formaldehyde copolymer having a molecular weight from 1,000
to 200,000 and a water soluble aluminum metal salt wherein the ratio of said
copolymer to said aluminum metal salt is from 22.5:1 to 1:4;

(b) adjusting the pH of said water to 7 to 10 and collecting detackified paint;
and

15 (c) removing said detackified paint from said water.

10. A method of detackifying paint overspray contained in water in a paint booth
substantially as hereinbefore described with reference to the example.

20 DATED: 5 September, 1994

PHILLIPS ORMONDE & FITZPATRICK

Attorneys for:

DIVERSEY CORPORATION

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25 12872Typing

