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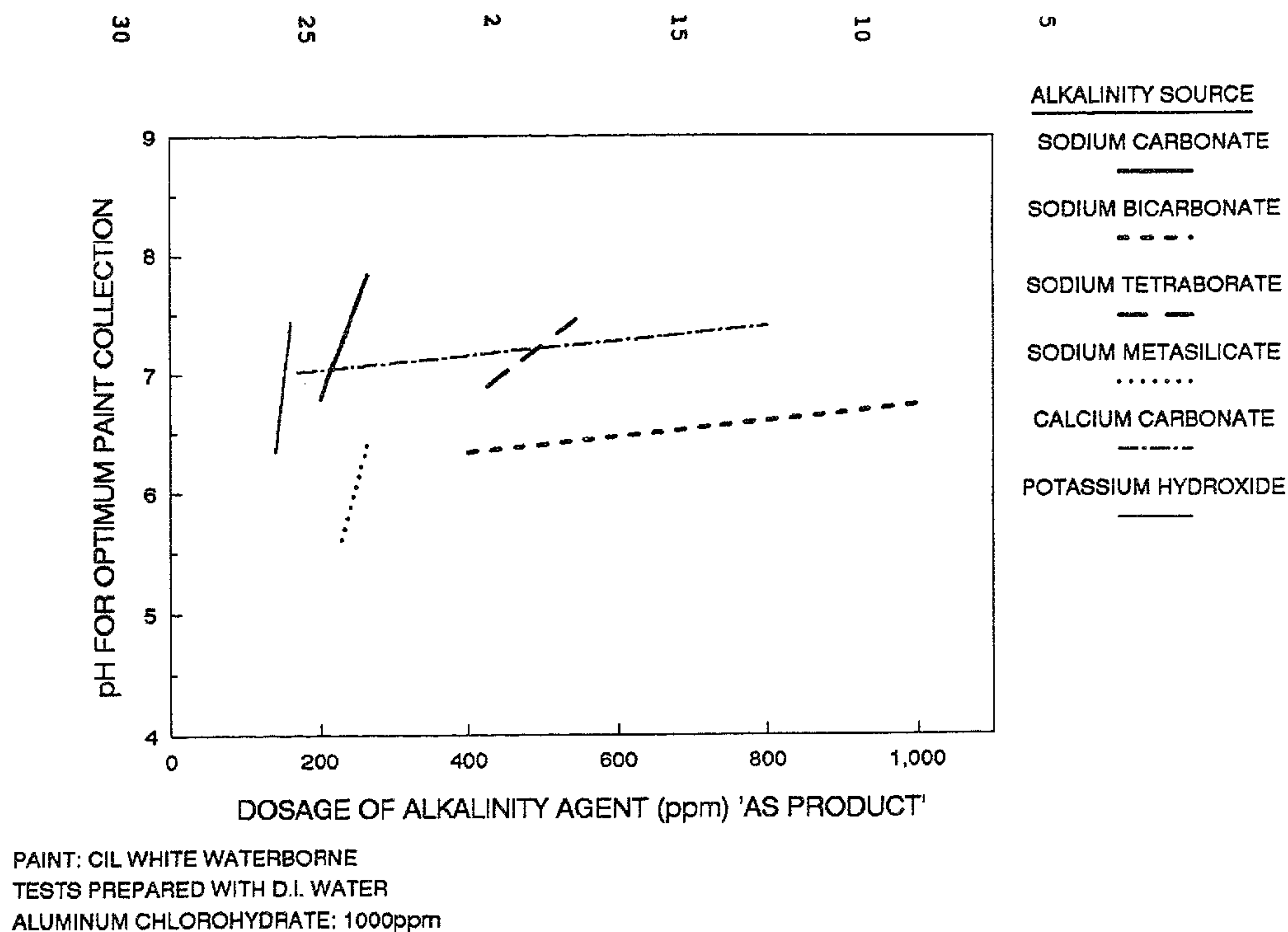
(72) Inventeur/Inventor:
REY, PAUL A., US

(73) Propriétaire/Owner:
CALGON CORPORATION, US

(74) Agent: GOUDREAU GAGE DUBUC

(54) Titre : METHODE POUR ENLEVER LES PARTICULES DE PEINTURE SOLIDE DE L'EAU DES OPERATIONS DE
PISTOLAGE AU MOYEN DE SELS D'ALUMINIUM

(54) Title: METHOD FOR REMOVING PAINT SOLIDS FROM WATER-BASED PAINT SYSTEMS USING ALUMINUM
SALTS



(57) Abrégé/Abstract:

Methods of treating circulating water containing oversprayed, water-borne paint, such as in a paint spray booth operation, with aluminum salts such as aluminum chloride or polyaluminum chloride and a flocculant, resulting in removal of sludge from the paint spray booth water.



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TITLE OF THE INVENTION

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"METHOD FOR REMOVING PAINT SOLIDS FROM
WATER-BASED PAINT SYSTEMS USING
ALUMINUM SALTS"

ABSTRACT OF THE DISCLOSURE

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Methods of treating circulating water containing
oversprayed, water-borne paint, such as in a paint
spray booth operation, with aluminum salts such as
aluminum chloride or polyaluminum chloride and a
flocculant, resulting in removal of sludge from the
paint spray booth water.

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TITLE OF THE INVENTION

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"METHOD FOR REMOVING PAINT SOLIDS FROM
WATER-BASED PAINT SYSTEMS USING
ALUMINUM SALTS"

BACKGROUND OF THE INVENTION

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Automobile bodies and many industrial and consumer articles are conventionally spray painted in areas called spray booths, wherein water is employed to cleanse the air of over-sprayed paint. The wash water is then treated to remove paint solids, and the treated water is recirculated. The circulating water typically contains less than about 10,000 ppm of suspended solids. A well run system generally contains less than about 500 ppm of suspended solids in the circulating water.

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Fine droplets of over-sprayed paint, emitted by a spray gun, contact and are captured by the water. The amount of paint contacting a water curtain may change depending on a number of variables, including plant or

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rocess shutdowns, the size and shape of the object
being painted, the type of spray equipment used, the
spraying and purge technique used, the water flow rate
and the type of paint used.

In the past, solvent-based or solvent-borne paints
have commonly been employed in spray booths. Federal
regulations now limit the amount of volatile organic
compounds (i.e., vocs) that can be released at a given
plant site. Since organic solvent diluents used in
solvent-based paint are a major source of vocs,
water-borne or water-based paints are now being used in
spray booth operations to help comply with these
regulations.

The term "water-based paints", as used herein,
refers to all varieties of coatings which contain in
excess of approximately 10% water in the coating
formulation, including, but not limited to,
water-reducible alkyd and epoxy ester compositions,
water-borne thermoplastic compositions using acrylic
polymer/copolymers, water-based polyurethane
dispersions, and blends of such compositions. As used
herein, the terms "water-based paints" and "water-borne
paints" are synonymous.

5 A primary treatment objective relative to
solvent-based paints concerns the tacky or adhesive
nature of the over-sprayed coating material. Due to
their hydrophobicity, solvent-based solids tend to
coalesce and adhere to the walls, ceilings, floors or
10 spray areas of spray booth systems and in their
scrubber sections. Thus, the over-sprayed paint mist
captured in the water system of a spray booth must be
detackified, or "killed," to prevent accumulation on
the walls, piping, etc. of the spray booth system.
Paint that sticks to spray booth surfaces usually
15 cannot be easily removed from equipment and tends to
build up over time, thereby hampering spray booth
efficacy.

20 In contrast, the primary treatment objective
relative to water-based paints is to capture and
collect finely-dispersed paint solids. Water-based
paints are not tacky in nature. However, without
treatment, these paints tend to remain dispersed due to
their compatibility with water. Ultimately, uncaptured
25 solids accumulate in the system and settle in sludge
recovery pits and in booth weirs. Such solids
encourage the growth of anaerobic bacteria colonies
which may result in odor problems. This treatment
problem is aggravated by the use of water-based paints
30 because such paints generally contain resins and dyes
which are highly compatible with water.

5 Other problems which severely interfere with spray
booth operations occur in areas of high agitation where
foaming occurs and in areas where foam accumulates.
Foaming is caused by chemical additives, surfactants,
solvents or combinations thereof. Also, finely
10 dispersed paint solids which are not captured and
removed tend to stabilize foam, which aggravates
foaming problems. Foaming generally mandates that
copious amounts of defoamers be used, which results in
higher operating costs. Water-based paints generally
tend to cause foaming to a greater extent than
15 solvent-based paints.

A wide variety of chemicals have been proposed as
treating agents for circulating wet spray booth waters
containing over-spray paint, including compositions
20 containing polymers and amphoteric metal salts which
form insoluble hydroxides at pH's greater than about
7. The use of combinations of this type are described
in the following U.S. Pats.: 3,861,887 to Forney;
3,990,986 to Gabel et al; 4,002,490 to Michalski et al;
25 4,130,674 to Roberts et al; and 4,440,647 to
Puchalski. Further, U.S. Pat. No. 4,637,824 to
Pominville discloses the use of silicates and
polydiallyldialkylammonium halides with amphoteric
metal salts, and U.S. Pat. No. 4,853,132 to Merrell et
30 al discloses the use of precipitates formed by the
reaction of cationic polymers and salts of inorganic
anions to detackify solvent-based paints. Bentonite

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5 clays, aluminum salts and zinc salts have also been
used with cationic polymers. U.S. Pat. No. 4,401,574
to Farrington et al discloses the use of polyaluminum
chloride to flocculate and settle dispersed paint
solids resulting from the production of latex paints
and U.S. Pat. No. 4,026,794 to Mauceri discloses water
10 soluble salts of amphoteric metals in combination with
dimethyl diallyl ammonium polymers to break oil-in-
water emulsions. JP52071538 discloses the use of
coagulants such as aluminum sulphate, aluminum
polychloride and calcium hydroxide in combination with
15 polymer accelerators to aggregate coating particles in
coating booth waste water streams. U.S. Pat. Nos.
4,759,855 and 4,880,471 disclose the use of alkaline
zinc solutions containing ammonium hydroxide and
ammonium chloride to treat over-sprayed paint.

20 DESCRIPTION OF THE DRAWINGS

Figure 1 shows relationship between pH and
alkalinity using various alkalinity sources in a system
25 containing water-borne paints. In this figure, the pH
for optimum paint collection is that pH where water
clarity and paint flotation are maximized, with minimal
suspended solids. This figure represents a system
containing a CIL white water-borne paint with 1000 ppm
30 of aluminum chlorohydrate.

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5 Figure 2 shows the optimum operating window for a system containing a CIL white water-borne paint, sodium carbonate as the alkalinity source and aluminum chlorohydrate as the aluminum salt.

10 Figure 3 shows the titration curves of various aluminum salts with a sodium carbonate alkalinity source.

15 Figure 4 shows the impact of pH on treatment performance, in terms of supernatant clarity. In the system represented by this figure, a CIL white water-based paint was treated with soda ash and aluminum chlorohydrate.

20 SUMMARY OF THE INVENTION

25 The instant inventor has discovered that aluminum salts, in conjunction with specified polymeric flocculants, applied within designated pH and alkalinity ranges, can be used with improved results to treat water which collects and/or contains water-based paints. The relationship between paint addition and aluminum addition is not believed to be critical due to the non-tacky nature of the paint. The water, after capture and removal of the oversprayed, water-borne paint therefrom, is typically recirculated in paint
30 spray booth operations.

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5 More particularly, the present invention relates to
a method of treating the circulating water of a paint
spray booth system used to capture over-sprayed,
water-borne paint, which water contains or will contain
over-sprayed water-borne paint, to facilitate removal
of over-sprayed, water-borne paint from such water.
10 The method comprises a) maintaining the pH of the
circulating paint spray booth water being treated
between about 5.0 to about 9.0, preferably about 6.0 to
about 8.0, by adding an appropriate acid or base, while
maintaining alkalinity within the range of 50 - 2,000,
15 on a calcium carbonate basis, preferably 100-1000 ppm;
b) adding an effective amount of a designated aluminum
salt to the water being treated; c) contacting the
over-sprayed, water-borne paint with the pH and
alkalinity-maintained paint spray booth water before
20 the addition of an effective amount of the aluminum
salt or contacting the over-sprayed water-borne paint
with the pH and alkalinity-maintained water after the
addition of an effective amount of the aluminum salt;
d) adding an effective amount of a flocculant to the
25 treated paint spray booth water; and e) removing the
resulting sludge from the paint spray booth water.

The method of the present invention is highly
efficient for treating systems containing a wide
30 variety of water-based paints. Additionally, the
present method generally produces a well-flocculated

5 sludge which may be readily disposed of in land fills or by incineration.

These and additional advantages will be more apparent in view of the following detailed description.

10 DETAILED DESCRIPTION

15 The present invention relates to a method for treating circulating paint spray booth water containing or which will contain over-sprayed, water-based paint to facilitate the removal of the over-sprayed paint from the water being treated, i.e., the water of a spray booth system or operation. The present method comprises: a) maintaining the pH of the water in the aqueous system being treated, namely circulating paint spray booth water, between about 5.0 and 9.0, preferably about 6.0 to about 8.0, by adding an appropriate acid or base, while maintaining alkalinity within the range of 50-2,000 ppm on a calcium carbonate basis, preferably 100-1000 ppm; b) adding to said circulating water an effective amount of an aluminum salt; c) contacting over-sprayed water-borne paint with the pH and alkalinity-maintained paint spray booth water of step a) before or after addition of an effective amount of said aluminum salt; d) adding an effective amount of a flocculant to the pH and alkalinity-maintained circulating paint spray booth water, preferably after or simultaneous with addition

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5 of the aluminum salt; and e) removing the resulting
sludge from the paint spray booth water.

10 The pH of the water being treated should be
maintained between about 5.0 and about 9.0, preferably
between about 6.0 and about 8.0. As the pH is lowered
below about 5.0, corrosion in the system generally
increases. Paint treated at pH less than 5 tends to be
more adherent and stringy. These characteristics are
not conducive to good sludge recovery. On the other
hand, a pH of greater than about 9.0 generally results
15 in greater solids dispersion, thus creating less
efficient solids capture, and causes greater foam
generation. Caustic and sulfuric acid are the
preferred pH-adjustment agents, though other acids or
bases can be used.

20 Aside from pH, the alkalinity of the system being
treated should be maintained between about 50 and 2,000
ppm, preferably 100-1,000 ppm, on a calcium carbonate
basis, based on the total weight of the water in the
system being treated. The inventor has discovered
25 that, for a given alkalinity agent and a given system,
optimal treatment may be represented by a graph similar
to Figure 1, which shows effective alkalinity dosages
vs. pH for the system represented. This figure also
30 demonstrates that the impact of various alkalinity
agents on pH can vary substantially.

5 The inventor has discovered that optimum
performance of the instant aluminum salt program is
dependent on the aluminum salt used, the alkalinity and
the pH. There is a preferred range of alkalinity/
aluminum salt weight ratios for various alkalinity
agent/aluminum salt combinations which can be used.
10 These depend, among other things, on the ability of a
given alkalinity agent to disperse the paint(s) being
treated. As Figure 2 shows, paint treated with too
high of an aluminum/alkalinity ratio tends to result in
a water high in suspended solids, whereas too low of an
aluminum/alkalinity ratio generates flocculated paint
15 solids which settle (instead of float), leaving behind
a clear supernatant. The optimum aluminum/alkalinity
ratio range varies depending on the type of alkalinity
agent and the amount and type of aluminum salt used in
treating the paint solids. As used herein, optimum
20 performance is defined as that which yields floating
paint solids, clear subnatant water (as measured by
transmittance, for example) and low suspended solids.
This is shown as the center are of Figure 2.

25 Alkalinity, in addition to that normally present in
the system being treated, can be provided by NaOH, KOH,
sodium bicarbonate, sodium carbonate, sodium
tetraborate, sodium metasilicate, or calcium carbonate
30 (among others) and blends thereof. The preferred
alkalinity sources are NaOH, KOH, sodium bicarbonate
and sodium carbonate.

While any aluminum salt can be used, the aluminum salts of this invention preferably contain a chloride anion. The preferred aluminum salts are aluminum chloride, aluminum chlorohydrate, polyaluminum chloride (PAC), also called basic aluminum chloride and is represented by the empirical formula

$Al_n(OH)_mCl_{3n-m}$ ($n \geq 1.0$ and $m:n$ ratio = 0 to 2.5) and blends thereof. An advantage of the polymeric aluminum salts compared to other aluminum salts such as alum is that less pH adjustment is required. (See, for example, Figure 3.) In addition, it has been discovered that the polymeric aluminum salts form a larger, more efficient floc than alum. The improved efficiency of these products reduces the chemical demand and results in less dissolved solids being added to the system. This is very important since most plants operate on total water recycle and one parameter that controls blowdown of the system is the accumulation of dissolved materials. Blowdown refers to the replacement of recycle water with fresh makeup water. Additionally, the preferred aluminum salts produce a better solids removal on an equivalent Al_2O_3 basis.

An effective amount of the aluminum salt is added. As used herein, the term "effective amount" refers to that amount of aluminum salt necessary to treat the paint solids present in a given system so as to yield a floc which floats, a clear supernatant and an acceptable level of suspended solids. Generally, about 1:20 to

5 about 20:1 paint solids:aluminum salt is required, on a
dry solids basis. Preferably, the dosage ranges from
about 1:4 to about 4:1 paint solids:aluminum salt, and
most preferably from about 1:3 to about 3:1 paint
solids:aluminum salt. The aluminum salts may be added
by any suitable means. Additionally, the aluminum
10 salt/alkalinity source weight ratio is believed to be
critical, as shown in Figure 2. This figure shows that
an aluminum chlorohydrate/sodium carbonate system has a
specific aluminum salt/alkalinity ratio range wherein a
clear subnatant is produced with a floc that floats.
15 An effective aluminum salt/alkalinity ratio should be
used. As used herein, an effective aluminum
salt/alkalinity ratio is a ratio which gives a clear
subnatant and a floc which floats, as exemplified by
the center region of Figure 2.

20 After oversprayed, water-based paint contacts the
aluminum salt added to the circulating water, an
effective amount of a polymer flocculant is added to
the paint spray booth water system. The flocculant
25 promotes the formation of a buoyant floc structure by
binding the aluminum salt-conditioned paint particles
while allowing air to be incorporated into the floc
structure. The resulting floating floc facilitates the
removal of paint solids from the circulating water
30 system.

According to this invention, the type and molecular
weight of the polymeric flocculant used are not

5 believed to be critical. Generally, polymeric flocculants having weight average molecular weights of at least 2×10^6 are preferred. More preferably, the molecular weight should exceed about 6×10^6 .

10 Examples of suitable flocculants include long chain high molecular weight polyacrylamides and copolymers of acrylic acid and acrylamide or long chain poly-methacrylamides. Preferred flocculants are nonionic or slightly anionic polyacrylamides (hydrolyzed polyacrylamides) having a weight average molecular weight ranging from about 6×10^6 to about 20×10^6 .
15 Generally, the anionic functionality of such hydrolyzed polyacrylamides should not exceed about 30%, by weight.

20 Typical cationic polyelectrolytes which may be used as flocculants in the instant invention include but are not limited to polyphosphonium compounds, polysulfonium compounds, quaternary ammonium compounds, polymers of methacryloyloxyethyl trimethyl ammonium methyl sulfate (METAMS), polymers of methacrylamido propyl
25 trimethylammonium chloride (MAPTAC), polymers of acryloyloxyethyl trimethyl ammonium chloride (AETAC), polymers of methacryloyloxyethyl trimethyl ammonium chloride (METAC) and polymers prepared from combinations of METAMS, MAPTAC, AETAC and/or METAC with
30 acrylamide and/or methacrylamide. Representative of quaternary ammonium compounds are diethyl diallyl

ammonium and dimethyl diallyl ammonium polymers and salts thereof.

Other acceptable flocculants are quaternary ammonium polymers such as polydimethyl diallyl ammonium chloride (polyDMAAC), poly dimethyl diallyl ammonium bromide (polyDMAAB), poly diethyl diallyl ammonium chloride (polyDEDAAB), or any of the same copolymerized with acrylamide or methacrylamide. The preferred molecular weights for the quaternary ammonium polymers are in excess of about 2,000,000.

The most preferred cationic flocculant is a polymer comprising dimethyl diallyl ammonium chloride and acrylamide, or a homologue thereof, having a weight average molecular weight in excess of about 4,000,000. The ratio of the nonionic moiety (for example, acrylamide or methacrylamide) to the cationic moiety should be greater than about 1:1, on an active weight basis.

Blends of the above listed flocculants can also be used.

An effective amount of the polymeric flocculant should be added. The effective amount depends primarily upon the quantity of over-sprayed paint and aluminum salt present in the system being treated. Preferably, the effective flocculant dosage will range

5 from about .01 to about 150 parts (active weight basis)
of the polymeric flocculant per part paint, and
morepreferably, 0.1 to 20 parts, on an active
polymer:paint basis.

10 The function of the polymeric flocculant is
two-fold: it interacts with the aluminum salt and the
paint to form a large, buoyant, easily-captured floc,
and it generally reduces foam formation in the system
by removing colloidal particulates present in the
water.

15 A requirement of the present invention is that the
flocculant be added to the paint spray booth water
after the over-sprayed, water-borne paint is contacted
with the pH and alkalinity-maintained paint spray booth
20 water. Thus, the flocculant can be added along with or
after addition of the aluminum salt. The flocculant
can be added by any convenient means. Once the treated
paint solids have been contacted with at least one
polymeric flocculant, the resulting sludge is removed
25 from the water. This removal may be facilitated by
any means known in the art, including but not limited
to, flotation and filtration.

30 Other additives commonly used for the treatment of
water containing oversprayed paint may generally be
used in conjunction with the instant method. For
example, bentonite clays, carbon black, talc, gums
starch, dextrin, lime, aluminum oxide, silica solids,

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5 and casein among other additives, may be used as
additional process aids in conjunction with the primary
steps of the instant method. Additives from the class
of amphoteric metal salts, including, but not limited
to, ferric sulfate and ferric chloride, can also be
used to enhance the performance of the instant
10 invention.

EXAMPLES

15 The following examples are intended to further
demonstrate the instant invention. They are not,
however, intended to in any way limit the instant
invention. In these examples, the following general
procedure was followed:

- 20 1. The alkalinity of the water was adjusted the
desired range with the designated alkalinity
agent; the pH was adjusted, if necessary, to
the desired value using caustic or sulphuric
acid.
- 25 2. 200 mls of the alkalinity-adjusted water was
added to a 400 ml wide mouth jar.
- 30 3. The water was mixed, using a Fisher Science
Thermix Magnetic Stirrer Model 120M (setting 9
was used).

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4. The designated aluminum salt was added.
5. 0.2 grams of the paint were added.
6. The dispersibility of the paint was noted.
7. The system was mixed for 45 seconds.
8. A flocculant solution [2 ml of 1 g/l polyacrylamide solution (active basis)] was added. A commercially available polyacrylamide having a molecular weight of 10-15 mm was used to prepare the flocculant solution.
9. The system was mixed for 30 seconds.
10. The stirrer was turned off.
11. The floc rise rate and sludge characteristics were noted.
12. The system was allowed to stand for 2 minutes.
13. The water clarity was measured, as % transmittance using a Bausch and Lomb Spectronic mini 20 spectrophotometer @ 450 nm.

Examples 1-5

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1. A CIL white water-borne paint was dispersed in water containing 500 ppm sodium carbonate as the alkalinity source and was then treated with 3900 ppm of aluminum chlorohydrate. The treated paint solids were then flocculated with a nonionic polyacrylamide according to the general test procedure given above. All of the captured paint floated, the supernatant clarity was 93% and the final pH was 8.2.
2. A CIL white water-borne paint was dispersed in water containing 1500 ppm sodium bicarbonate as the alkalinity source and was then treated with 2000 ppm of aluminum chlorohydrate. The treated paint solids were flocculated with a nonionic polyacrylamide according to the general test procedure given above. All of the captured paint floated, the supernatant clarity was 97% and the final pH was 7.5.
3. A CIL metallic silver water-borne paint was dispersed in water containing 400 ppm sodium carbonate as the alkalinity source and was then treated with 1000 ppm of an AlCl_3 /polyacrylamide blend, which resulted in 80% supernatant clarity and 100% of the captured paint floating.

4. A CIL white water-borne paint was dispersed in water containing various amounts of sodium carbonate alkalinity. The treated paint solids were then flocculated with a nonionic polyacrylamide according to the general test procedure given above. The final pH was recorded and related to the water clarity. The results are illustrated in Figure 4.
5. A blend of BASF water-borne paints was run according to the general procedure given above. The pH of each test was maintained at about 7.5. The alkalinity was adjusted to accommodate the different dosages of aluminum salt using sodium carbonate. Various aluminum salts were evaluated for performance and the relative equivalent dosage required to produce comparable water clarity was established. Equivalent dosage (for this example) is defined as the amount of aluminum salt required to produce a water with 90% transmittance. The relative equivalent dosage relates the dosage of the various aluminum salts to that of alum.

The results are summarized in Table I.

TABLE I

<u>Aluminum Salt</u>	<u>Dosage (ppm)</u>	<u>Transmittance @ 480 nm (%)</u>	<u>Relative Equivalent Dosage</u>
10	PolyAluminum Chloride		
	500	30	0.70X
	1000	46	
	2000	84	
	2500	95	
15	Aluminum Sulfate		
	500	28	1.00X
	1000	40	
	2000	60	
	3000	88	
	4000	88	
20	Aluminum Chlorohydrate		
	500	60	0.28X
	750	83	
	1000	94	
25	Aluminum Chloride		
	500	35	0.84X
	1000	46	
	2000	80	
	2500	86	
	4000	98	

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WHAT IS CLAIMED IS:

- 5 1. A method of treating circulating water in a paint spray booth system used to capture over-sprayed, water-borne paint, which method comprises:
- 10 (a) maintaining the pH of the circulating water between 5 and 9, while using an alkalinity agent to maintain the alkalinity of said circulating water within the range of 50-2,000 ppm, on a calcium carbonate basis;
- 15 (b) adding to said circulating water an effective amount of an aluminum salt;
- 20 (c) contacting said over-sprayed, water-borne paint with said circulating water, after completing step (a) and before or after completing step (b);
- 25 (d) adding an effective amount of a flocculant to said circulating water after completing steps (a), (b) and (c) to obtain a resulting sludge; and
- (e) removing the resulting sludge from said circulating water.
- 30 2. The method of Claim 1, wherein said aluminum salt is selected from the group consisting of aluminum chlorohydrate, aluminum chloride, polyaluminum chloride and blends thereof.

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5 3. The method of Claim 2, wherein said aluminum salt is a polyaluminum chloride.

 4. The method of Claim 2, wherein said aluminum salt is a blend.

10 5. The method of Claim 2, wherein said flocculant is selected from the group consisting of long chain polyacrylamides, copolymers of acrylic acid and acrylamide and polymethacrylamides, wherein said copolymers possess an anionic functionality less than
15 or equal to 30%, by weight.

 6. The method of Claim 2, wherein a cationic polyelectrolyte is used.

20 7. The method of Claim 2, wherein the pH of said water is adjusted to between 6 and 9.

 8. The method of Claim 5, wherein said alkalinity agent is selected from the group consisting of NaOH,
25 KOH, Na₂CO₃, NaHCO₃, Na metasilicate, calcium carbonate, Na tetraborate and blends thereof.

 9. The method of Claim 6, wherein said alkalinity agent is selected from the group consisting of NaOH,
30 KOH, Na₂CO₃, NaHCO₃, Na metasilicate, calcium carbonate, Na tetraborate and blends thereof.

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10. The method of Claim 1, wherein the aluminum
salt and the flocculant are added simultaneously.

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FIGURE 1.

ALKALINITY SOURCE

SODIUM CARBONATE

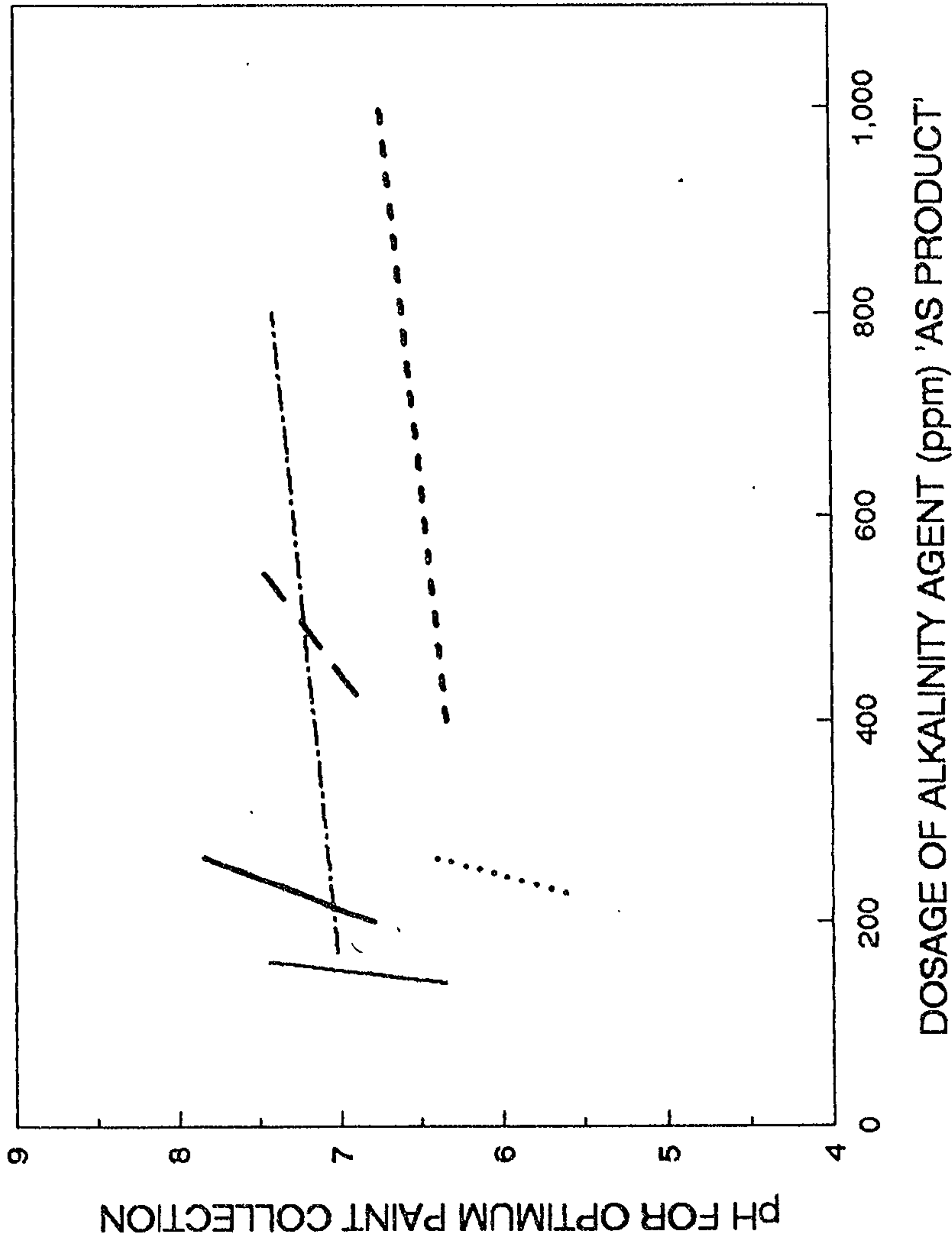
SODIUM BICARBONATE

SODIUM TETRABORATE

SODIUM METASILICATE

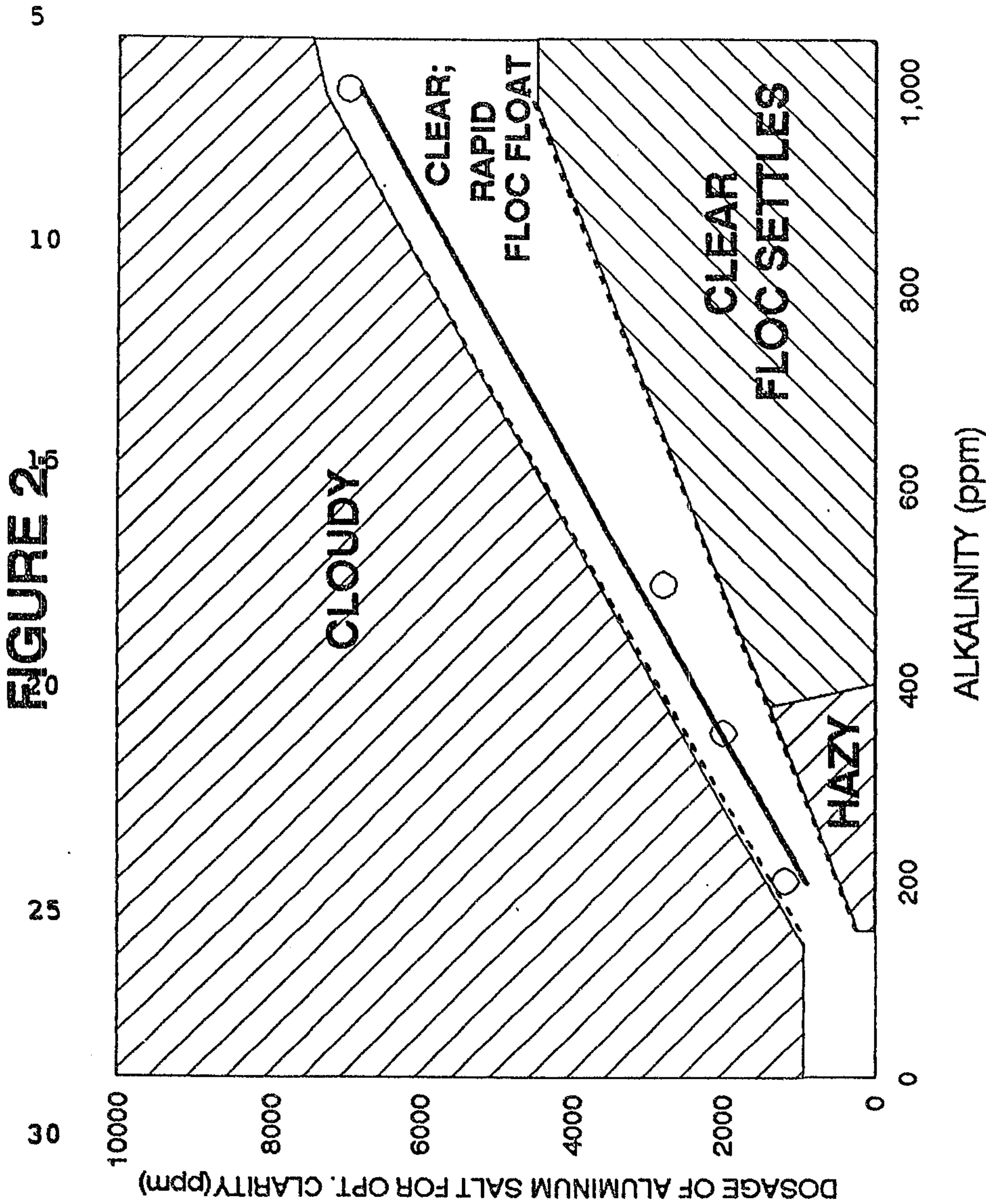
CALCIUM CARBONATE

POTASSIUM HYDROXIDE



PAINT: OIL WHITE WATERBORNE
TESTS PREPARED WITH D.I. WATER
ALUMINUM CHLOROHYDRATE: 1000ppm

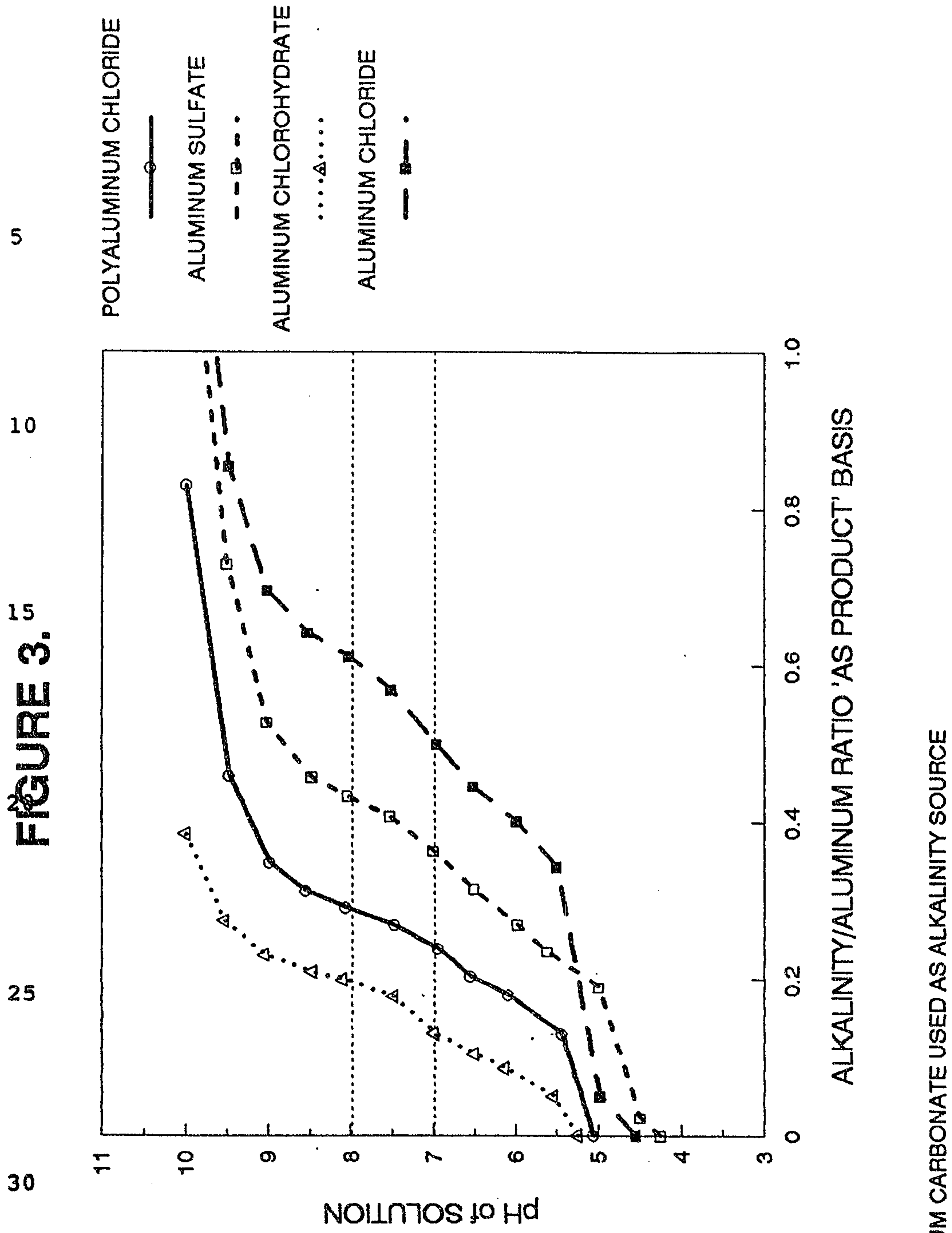
Anderson, R. G. & R. J. Walker



CIL WHITE WATERBORNE PAINT
ALKALINITY AGENT: SODIUM CARBONATE
ALUMINUM SALT: ALUMINUM CHLOROHYDRATE

Andrew Lloyd Deane & Stephen Walker

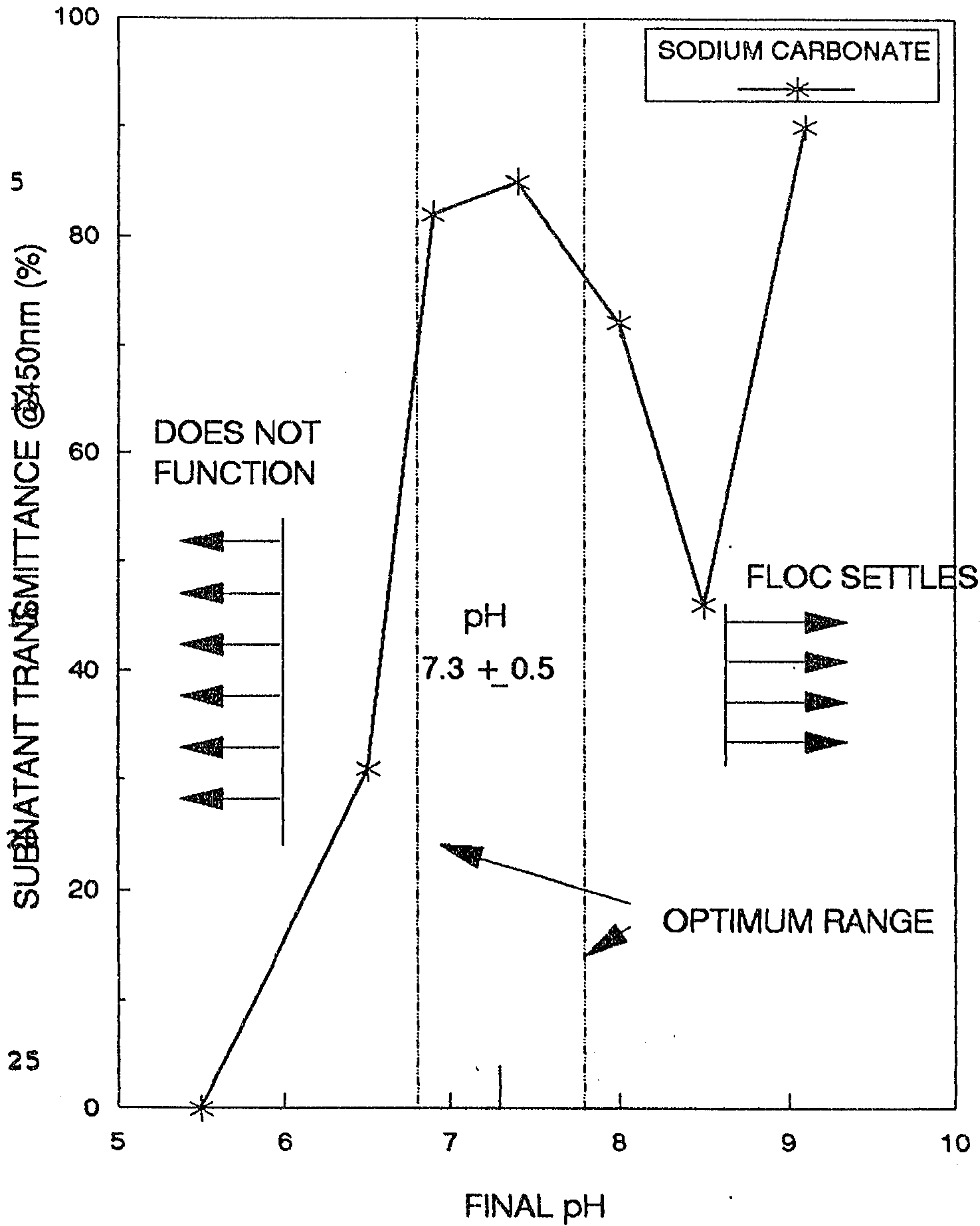
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SODIUM CARBONATE USED AS ALKALINITY SOURCE

Gordon Sage Carter & Herbert Walker

FIGURE 4.

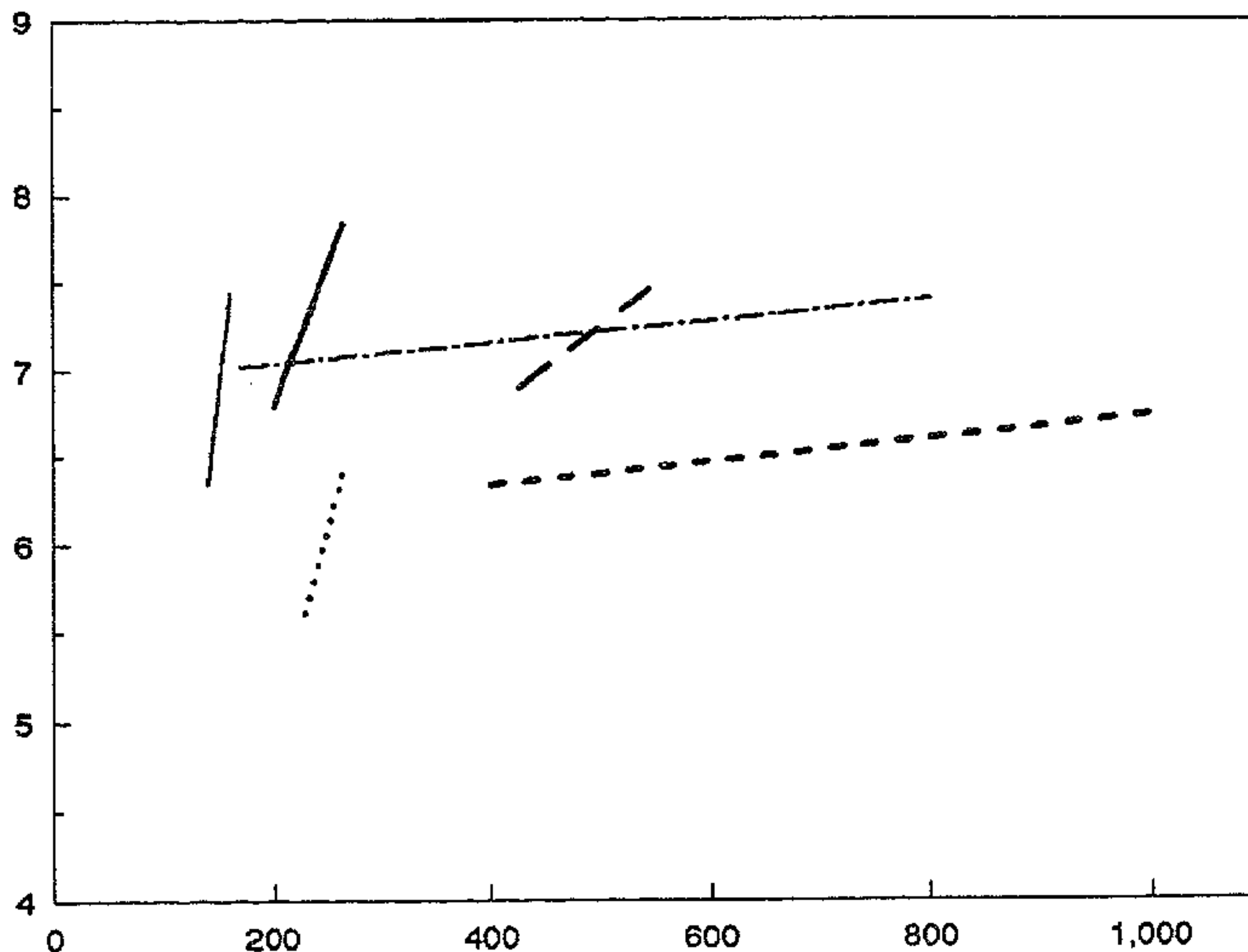


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CIL WHITE WATERBORNE PAINT
 1000ppm aluminum chlorohydrate
 1000ppm paint

Judson, Dage, Dubue & Hesterman Walker

pH FOR OPTIMUM PAINT COLLECTION



ALKALINITY SOURCE

SODIUM CARBONATE

SODIUM BICARBONATE

SODIUM TETRABORATE

SODIUM METASILICATE

CALCIUM CARBONATE

POTASSIUM HYDROXIDE

PAINT: CIL WHITE WATERBORNE
TESTS PREPARED WITH D.I. WATER
ALUMINUM CHLOROHYDRATE: 1000ppm