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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



DELEGATURA PROPIEDAD INDUSTRIAL

División de Nuevas Creaciones

PCT
SOLICITUD

PATENTE DE INVENCION

ENTRADA EN FASE NACIONAL

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METODO DE TRATAMIENTO DE AGUA

51

CLASIFICACION INTERNACIONAL

71

SOLICITANTE

ARCH CHEMICALS, INC.

DOMICILIO

NORWALK, CONNECTICUT, ESTADOS UNIDOS DE AMERICA

74

APODERADO

HECTOR GOMEZ MEJIA

22

SANTAFE DE BOGOTA, D.C.

PETITORIO

AS 96 901

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 Title: A11 PCT-PATENT 779 CASE NO. 411 DEFECTIVE
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1 SOLICITUD DE.			
☒ Patente de Invención		☐ Patente de Modelo de Utilidad	
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2 SOLICITANTE (71)	Nombre. ARCH CHEMICALS, INC. Dirección 501 Merritt 7, P O Box 5204, Norwalk, Connecticut 06856-5204, Estados Unidos de América Nacionalidad o Domicilio Estados Unidos Lugar de Constitución Estados Unidos Teléfono: Fax E-mail		IDENTIFICACION C C ☐ NIT ☐ C.E ☐ Otro ☐ Cual _____ Número _____
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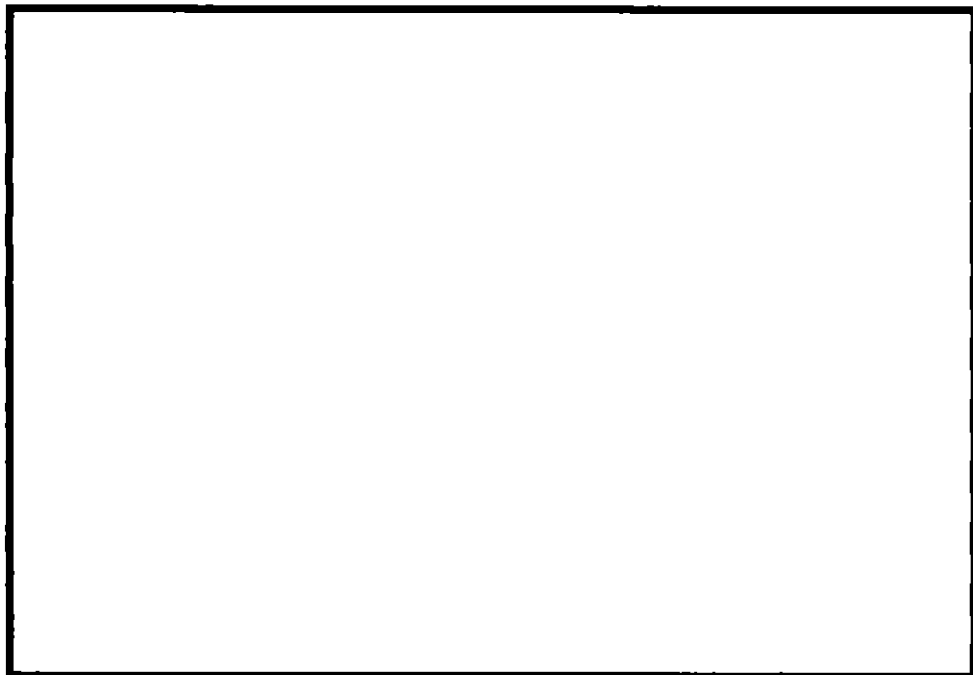
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ANEXOS

[Handwritten signature]

- ☒ Comprobante de pago de la tasa de presentación de la solicitud \$443.000
- ☒ Documento que acredite la existencia y representación legal cuando el solicitante sea persona jurídica.
- ☒ Poderes, si fuere el caso.
- ☐ Documento de cesión del inventor al solicitante o a su causante.
- ☐ Declaraciones
- ☒ Copia de la solicitud internacional (Resumen descripción reivindicaciones, dibujos)
- ☒ Traducción de la solicitud internacional al castellano. (Resumen descripción, reivindicaciones, dibujos)
- ☒ Copia del examen preliminar efectuado por la IPEA.
- ☐ Traducción del examen preliminar efectuado por la IPEA.
- ☐ De ser el caso, copia del contrato de acceso.
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas.
- ☐ De ser el caso, certificado de depósito del material biológico.
- ☐ Arte final 12x12
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud
- ☒ Otros: Tarjeta de propietarios.

11 FIGURA CARACTERÍSTICA.



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(54) Title: METHOD OF WATER TREATMENT

(57) Abstract: The invention relates to a method of treatment of bodies of water such as recreational pools, spas and hot tubs with maintenance doses of water treatment chemicals to achieve consistent sanitization and aesthetically pleasing levels of properties such as turbidity. The amount of the maintenance doses is based on the volume of water to be treated in order to achieve hygienic and clear water. The method can be automated for accurate, consistent and safe treatment of water such as found in swimming pools, spas or hot tubs

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METHOD OF WATER TREATMENT

This invention relates to methods for sanitation and clarification of water. Recreational pools such as swimming pools, spas and hot tubs provide a great deal of pleasure and comfort. The extent of comfort depends on the quality of the water. In order to assure comfort and safety to users of these pools, it is important that the water be treated properly so that it is aesthetically pleasing in terms of taste, colour, turbidity and odour. Proper treatment also is important so that the water has proper pH, and is environmentally safe as well as effectively free of pathogens and chemicals which may cause illness.

Conventional methods of treatment of water in recreational pools utilize water treatment chemicals such as oxidizers, sanitizers, algicides and pH buffers. Typically, the chemicals are measured and manually added to the water as part of an overall water maintenance program. In such a program, various water quality parameters are measured at regular intervals. When a parameter is not acceptable, an appropriate amount of water treatment chemical is measured and manually added to the water. In so doing, the user is undesirably exposed to the concentrated chemical.

Mixtures of chemicals also have been added to recreational pool water. Addition of mixtures of chemicals to promote water clarity is shown in U.S. Pat. No. 5,501,802. This patent discloses a mixture that includes polyhexamethylene biguanide sanitizer, persulfate salt oxidizers and chelating agents. U.S. Pat. Nos. 5,514,287 and 5,478,482 disclose a composition and a method for controlling microbial growth in recirculating water systems. The composition includes a soluble boron contributor, a halogen/boron sanitizer/algicide, and an oxidizing clarifier which includes a chlorine compound, a non-halogen oxidizer, and a boron source.

U.S. Pat. No. 4,848,979 discloses an algicide composition for treating swimming pools and spas. The algicide composition includes an alkali metal, alkaline earth metal or ammonium bromide and an oxidizer.

A popular sanitizer for water treatment is based on the polymeric biguanide described in U.S. Pat. No. 4,014,876. Use of polymeric guanides such as BAQUACIL® Sanitizer and Algistat sold by Aveda Inc. is popular because they do not cause eye irritation that is common with use of chlorine.

Water treated with BAQUACIL® Sanitizer and Algistat also can be treated with a separate algicide to combat algae. Oxidizers such as those which include hydrogen peroxide as the active component also may be added to the treated water to oxidize organic compounds in the water to promote clarity. An example of such an oxidizer is BAQUACIL® Shock and Oxidizer (from Aveda Inc.). BAQUACIL® Shock and Oxidizer is an aqueous solution that includes 27.5% hydrogen peroxide.

Consumers typically treat water found in pools, spas and hot tubs with chemicals

such as sanitizers, oxidizers and algicides. Due to complexities such as the differing times specified for dosing various water treatment chemicals, difficulties in accurately measuring dosages, exposure to chemicals as well as cost of chemicals, consumers tend to avoid treating the water until problems such as haze and algae build-up occur.

A need therefore exists for a method that avoids these complexities and enables ready treatment of water such as that found in recreational pools.

The invention achieves controlled, continuous introduction of sanitizing and clarifying chemicals into water to maintain a desired residual level of those chemicals. The method may be employed in an automated dosing system.

In a first aspect, the invention relates to a method of treatment of bodies of water such as recreational pools, spas and hot tubs with maintenance doses of water treatment chemicals to achieve consistent sanitization and aesthetically pleasing levels of properties such as turbidity. The amount of the maintenance dose is based on the volume of water to be treated in order to achieve hygienic and clear water. More particularly, in this aspect a volume of water is treated to maintain a predetermined amount of a water treatment chemical. The method entails determining an amount of a water treatment chemical to be preserved in a volume of water to be treated. A maintenance dose of the chemical is added to the volume of water to maintain about the amount of the chemical in the water over a desired time period. The maintenance dose is determined from $MD = (PV)(DC)$ where MD = Maintenance dose of water treatment chemical, PV = Volume of water to be treated, and DC = Consumption amount of water treatment chemical over that desired time period. The maintenance dose may be supplied by a pump that has a pump tube displacement and which operates for a run time RT as determined by

$$RT = ((K) (MD)/(PRPM \times PTD))$$

where:

RT = Run time of pump (sec)

PRPM = Pump speed (RPM)

PTD = Pump tube displacement (ml)/pump revolution

K = 1776 ((sec·ml)/(min·oz)), and

MD is defined as above.

In another aspect, the invention relates to a system for treating a volume of water to maintain a predetermined amount of a water treatment chemical in the volume of water. The system includes a device for delivering a water treatment chemical to a volume of water where the device preferably is controlled by a computer. The device is caused to operate for a time sufficient to deliver a maintenance dose of water treatment chemical sufficient to maintain the predetermined amount of water treatment chemical in the volume of water over a desired time period. The maintenance dose $MD = (PV)(DC)$ where MD = maintenance dose of water treatment chemical, PV = Volume of water to be treated, and DC = Consumption amount of water treatment chemical over that desired time period.

The method of the invention achieves significant advantages. The method enables maintenance of a desired residual amount of a water treatment chemical such as a sanitizer, oxidizer or algicide in the water to control bacteria and nuisance algae and to achieve consistently low levels of turbidity. The maintenance dose may be added without the need for first measuring the amount of a water treatment chemical in the water prior to adding the maintenance dose of water treatment chemical as with manual additions of the chemical.

The method achieves water clarification in conjunction with an existing overall water maintenance program without adversely affecting other water quality parameters. The invention advantageously achieves improved water clarity and reduced amounts of algae on a consistent basis.

The method may be automated to minimize consumer exposure to chemicals, and to avoid errors of measurement that produce incorrect dosing of chemicals. Existing technology such as existing automatic dosing technology requires the customer to first calculate the dose of chemicals appropriate for effective treatment of their pool, spas and the like. Maintenance dosing as in the invention avoids the inaccuracies of under/overdosing associated with manual additions of water treatment chemicals. Automated maintenance dosing by a device such as a programmable pump, as in, for example, the BAQUACIL AD™ Automated Dosing System from Aveda Inc., provides an accurate, consistent and safe method of dosing water treatment chemicals.

Although the method may be used to treat pools, spas, hot tubs and the like, it is particularly suitable for treating recreational pools. The invention, in addition to treatment of recreational water such as swimming pools and hot tubs, may be used in a variety of other water treatment applications. Examples of these applications include home water treatment, community water treatment, industrial water treatment, agriculture, water reuse and groundwater injection.

Water treatment chemicals which may be used in the method include but are not limited to sanitizers, oxidizers and algaecides. Sanitizers which may be employed include but are not limited to oxidizing biocides and non-oxidizing biocides.

Oxidizing biocides which may be used include but are not limited to chlorine dioxide, alkali metal hypochlorite such as lithium hypochlorite and sodium hypochlorite, alkaline earth metal hypochlorites such as calcium hypochlorite, chlorinated isocyanurates, sodium dichloro-s-triazinetriene, trichloro-s-triazinetriene and potassium dichloro-s-triazine triene, and halogenated hydantoins such as 1,3-bromo-chloro-dimethylhydantoin, and 1,3-dibromodimethylhydantoin.

Non-oxidizing biocides which may be used include but are not limited to (poly(hexamethylene biguanide) hydrochloride) such as BAQUACIL® from Aveda, preferably (poly(hexamethylene biguanide) hydrochloride).

Oxidizers which may be employed include but are not limited to peroxides such as hydrogen peroxide, potassium monopersulfate, chlorine dioxide, alkali metal perborates such as peroxide release agents as illustrated by sodium perborate, sodium persulfate, potassium monopersulfate and sodium percarbonates. Preferably, the oxidizer is hydrogen peroxide.

Algicides which may be employed include but are not limited to copper salts such as copper sulphate, copper citrate, copper EDTA (ethylene diaminetetraacetic acid), and copper gluconate, copper TEA (triethanolamine), colloidal silver, silver salts such as silver nitrate, quaternary or polyquaternary ammonium compounds such as poly(oxyethylene (dimethylimino) ethylene (dimethylimino) ethylene dichloride) available from Buckman Corp under the trademark WSP, sodium dimethyldithiocarbamate, 2-chloro-4,6-bis(ethylamino)-5-triazine, zinc salts such as zinc chloride and zinc oxide, benzyl alkyl ammonium chloride available from Lonza Corp. Preferably, the algicide is benzyl alkyl ammonium chloride.

Other chemicals which may be employed in the method include, for example, chelating agents such as ethylene diaminetetra acetic acid and triethanolamine, fungicides, pH control agents (acids and bases), corrosion inhibitors, and stabilizers.

An initial, predetermined amount of a water treatment chemical such as sanitizer, oxidizer, and algicide is added to the water. This initial amount typically is sufficient to inactivate biological contaminants in the volume of water undergoing treatment. Each of the sanitizer, oxidizer and algicide may be provided in the form of liquid, powder or gas. Where an aqueous solution of the water treatment chemical is employed, the aqueous solution has about 1% to about 80% (active) water treatment chemical. Accordingly, where a sanitizer is employed, the aqueous solution has about 1 wt.% to about 80 wt. % (active) sanitizer. Similarly, where an oxidizer is employed, the aqueous solution has about 0.5 wt.% to about 80 wt.% (active) oxidizer. Mixtures of water treatment chemical also may be employed.

The initial, predetermined amount of water treatment chemical is followed by one or more maintenance doses of the water treatment chemical. The maintenance doses are added in amounts sufficient to maintain a desired amount of the water treatment chemical in the water over a desired time period such as 24 hours. The maintenance dose may be the same or different from the initial amount of water treatment chemical added to the water. Preferably, maintenance doses of individual water treatment chemical are added to the volume of water. Mixtures of water treatment chemicals also may be added as a maintenance dose.

The maintenance dose of water treatment chemical added to the volume of water undergoing treatment is calculated according to equation (1)

$$MD = (PV) (DC) \quad (1)$$

where

MD = maintenance dose of water treatment chemical(oz.) added to compensate for loss of water treatment chemical over a given time period

PV = Volume of water to treated(gallons)

DC = Consumption amount of water treatment chemical in the volume of water (oz. water treatment chemical/1000 gallons water) over the given time period

DC is determined by measuring the consumption of a particular water treatment chemical in the type of water system being treated over a given time period. The consumption of the water treatment chemical can be determined by using known analytical techniques.

Maintenance doses of water treatment chemicals are added at selected time intervals, such as every 24 hours, to maintain a desired amount of water treatment chemical in the water. Maintenance doses of sanitizer such as BAQUACIL® Sanitizer and Algstat typically range from about 0.1 ppm/day to about 6.0 ppm/day, preferably about 1.0 ppm/day to about 3.0 ppm/day. The maintenance doses may be added based on a single determination of DC and while avoiding the need to re-measure the amount of water treatment chemical in the water.

The initial dose of oxidizer is added to the volume of water in an amount sufficient to oxidize organic material initially present in the volume of water. Maintenance doses of oxidizer then are added to maintain that amount of oxidizer. Maintenance doses of oxidizers such as BAQUACIL® Shock and Oxidizer from Avecia typically range from about 0.5 ppm/day to about 10.0 ppm/day.

The initial dose of algicide is added to the volume of water in an amount sufficient to prevent algal growth or bloom as determined visually. Maintenance doses of algicide are added in amounts sufficient to prevent algal growth or bloom over a period of 24 hours as determined visually.

The method of water treatment may be performed manually, and also may be automated. The method can be programmed into a device such as a pump to deliver a maintenance dose. The method may be automated by use of a supply device such as a tablet dispenser, powder dispenser, erosion feeder, venturi feeder, gas feeder, and pumps, preferably, a programmable pump. The device such as a pump can be programmed to operate at specific times for specific run time intervals to add maintenance doses of water treatment chemicals to the volume of water undergoing treatment.

The run-time during which the pump is operated to deliver a maintenance dose is calculated according to equation (2)

10

$$RT = ((K) (MD)/(PRPM \times PTD)) \quad (2)$$

where

RT = Run time of pump (sec) to deliver MD
 PRPM = Pump speed (RPM)
 5 PTD = Pump tube displacement (ml)/pump revolution
 K = Conversion constant (1776 ((sec-ml)/(min-oz)).

MD is defined as in equation (1)

To illustrate, assume a pool volume (PV) of 10,000 gal, and that (DC) of the water treatment chemical in the pool is 0.125 oz/1000gal/day. Substituting into Eq (1), MD is
 10 calculated as 1.25 oz. Substituting into Eq (2), where PRPM=20 and PTD=2, the RT of the pump is calculated as 55.5 sec.

A programmable pump useful in the water treatment method is the BAQUACIL AD™ Automated Dosing System from Aveda Inc. The BAQUACIL AD™ Automated Dosing System includes a dispensing unit that employs two pumps. The pumps are
 15 controlled by computer chip programmed according to Equations (1) and (2).

A programmable pump also may be used to add an initial dose of a water treatment chemical such as sanitizer, oxidizer and algicide to freshly-filled (or newly converted) water systems, as well as to administer top-up doses of sanitizer, algicide and oxidizer to established volumes of water to achieve a desired chemistry.

20 To illustrate the benefits of the invention, a set of 16 recreational test pools and a set of four recreational control pools are treated to compare the effect of maintenance doses of water treatment chemicals on control of water clarity and algae versus conventional weekly - monthly manual dosing of the same chemicals. The treatments also are done to evaluate automated additions of maintenance doses to confirm that the residual amount of water treatment chemical such as sanitizer can be maintained above
 25 30 ppm.

Automated additions of maintenance doses to the 16 test pools are made by using a programmable pump such as that in the BAQUACIL AD™ Automated Dosing System from Aveda. The four control pools are manually treated with maintenance doses. Each
 30 test pool is treated with a predetermined, initial dose of sanitizer, oxidizer and algicide by using the BAQUACIL AD™ Automated Dosing System.

An initial dose of the sanitizer BAQUACIL AD™ Sanitizer and Algostat (20% PHMB, polyiminolimidocarbonylminolimidocarbonyl hexamethylene hydrochloride, US EPA Reg No 72674-19) from Aveda Inc. is added as above in the amount of 64 oz/10,000 gallons to achieve 50 ppm of the sanitizer in each test pool. Similarly, an initial dose of the
 35 oxidizer BAQUACIL AD™ Shock and Oxidizer (27.5% hydrogen peroxide) from Aveda Inc. is added as above in the amount of at 128 oz/10,000 gallons to achieve 100 ppm of the oxidizer in each test pool. An initial dose of the algicide BAQUACIL AD™ Algicide 10 (9.96% n-alkyl (C₁₄, 60%, C₁₆, 30%, C₁₂, 5%, C₁₈, 5%) dimethyl benzyl ammonium

chloride, dialkyl (C₁₄, 60%, C₁₆, 30%, C₁₂, 5%, C₁₈, 5%) methyl benzyl ammonium chloride in water, US EPA Reg No. 6836-247-72674) from Avecla Inc. is added as above in the amount of 32 oz (10% active)/10,000 gallons to achieve 2.4 ppm of the algicide in each test pool

5 After having added the initial doses, each of the test pools is treated at 24-hour intervals with maintenance doses of the sanitizer, oxidizer, and algicide by using a programmable pump according to equation (2) A programmable pump is included in the BAQUACIL AD™ Automated System. Each test pool receives a maintenance dose of 1.25 oz of BAQUACIL AD™ Sanitizer and Algstat oxidizer per 10,000 gallons pool water, 10 4.6 oz of BAQUACIL AD™ Shock and Oxidizer per 10,000 gallons pool water, and 1.14 oz of algicide BAQUACIL AD™ Algicide 10 per 10,000 gallons pool water. The maintenance dose of sanitizer is in the form of a 20 wt.% aqueous solution, the maintenance dose of oxidizer is in the form of a 27.5 wt.% aqueous solution, and the maintenance dose of algicide is in the form of a 10 wt.% aqueous solution.

15 Each control pool is treated with an initial, predetermined dose of sanitizer, oxidizer and algicide water treatment chemicals. These initial doses are measured and manually added by pouring the chemicals around the perimeter of the pool. The initial dose of the sanitizer BAQUACIL® Sanitizer and Algstat (20% PHMB, polyiminimidocarbonylminimidocarbonyl hexamethylene hydrochloride, EPA Reg No 72674-19) from Avecla Inc. is added manually to each of the control pools to achieve 50 50 ppm of sanitizer in each pool. Similarly the initial dose of the oxidizer BAQUACIL® Shock and Oxidizer (27.5% hydrogen peroxide) from Avecla Inc. is added to achieve 100 ppm of oxidizer in each control pool. The initial dose of the algicide BAQUACIL® Algicide (49.8% n-alkyl (C₁₄, 60%, C₁₆, 30%, C₁₂, 5%, C₁₈, 5%) dimethyl benzyl ammonium chloride, 0.2% 25 dialkyl (C₁₄, 60%, C₁₆, 30%, C₁₂, 5%, C₁₈, 5%) methyl benzyl ammonium chloride in water EPA Reg No 72674-20) from Avecla Inc. is added to achieve 2.0 ppm of algicide in each control pool.

Maintenance doses of BAQUACIL® sanitizer are added manually every 10-14 days to the control pools. Maintenance doses of BAQUACIL® sanitizer are added when the 30 measured BAQUACIL level falls to or below 30 ppm. The BAQUACIL® sanitizer is added in an amount to achieve 50 ppm of the sanitizer in the pool volume. Maintenance doses of oxidizer are manually added in the amount of 128 oz oxidizer per 10,000 gallons pool volume once per month. Maintenance doses of algicide are manually added in the amount of 1.25 oz algicide per 10,000 gallons pool volume once per week.

35 All pools are examined a minimum of three times per month. Water samples are collected from each pool and tested for residual amounts of sanitizer and oxidizer. Water balance parameters, water temperature and turbidity, also are evaluated. The ppm levels of the oxidizer and the sanitizer in the pool water are measured by using the PINPOINT™ Water Analysis System Portable Lab from Avecla Inc. Turbidity is measured using a Hach

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Table A. Algae Ratings Percentages

System	Percentage of Ratings where the ratings ≤ 1	Percentage of Ratings where the ratings >1
Test pools dosed with the BAQUACIL AD™ auto dosing system	89 0	11 0
Control pools	75 0	25 0

5 As shown in Table A, the method of the invention provides superior control of all three types of algae, including the target *Chlorella* spp. (green algae) common to swimming pools

Evaluation of Clarity and turbidity testing

10 A visual assessment of water clarity is conducted a minimum of three times per month and assigned a water clarity rating between 0 and 4. The clarity rating reflects the turbidity of the water. A rating of "0" means the water is crystal clear, whereas a rating of "4" means the pool is so cloudy that no real depth could be perceived. The rating scale used to visually assess water clarity is listed in Table 2.

Table 2: Rating Scale for Visual Assessment of Water Clarity

15

Rating	Water Clarity Description
0	Sparkling clear water
1	Water appears dull, slight haze present
2	Main drain is visible but not distinct
3	Bottom of shallow end of visible, main drain is not
4	Cannot see bottom in the shallow end

An acceptable clarity rating is 1 or less. The percent of pools that have acceptable clarity rating readings are listed in Table B

Table B. Percent Acceptable and Unacceptable Clarity Ratings

System	Acceptable Ratings ≤ 1 (%)	Unacceptable Ratings >1 (%)
Test pools dosed with the BAQUACIL AD™ auto dosing system	95.5	4.5
Control (Manually dosed)	75.0	25.0

5 Test pools that are treated with maintenance doses according to the method of the Invention have a much lower incidence of hazy water than the control pools which are those dosed manually

10 The average turbidity value for the test pools is 0.7 NTU (Nephelometric Turbidity Units). This average turbidity value corresponds to a haze rating of 0 and is excellent. In comparison, the average turbidity value for the control pools that are not treated daily is much higher at 1.1 NTU. The lower average turbidity for the test pools correlates well with the visual assessment.

CLAIMS

1 A method of treating a volume of water to maintain a predetermined amount of a
water treatment chemical in the volume of water over a time period comprising,
5 determining an amount of a water treatment chemical to be preserved in a volume of
water to be treated, calculating a maintenance dose of the chemical to be added to the
volume of water to maintain about the amount of the chemical in the water over the time
period, providing a source of the chemical, and supplying the maintenance dose of the
water treatment chemical to the volume of water, wherein the maintenance dose is
10 calculated according to equation (1).

$$MD = (PV)(DC) \quad (1)$$

where

MD = Maintenance dose of water treatment chemical
15 PV = Volume of water to be treated
DC = Consumption of water treatment chemical over the time period
and

wherein the supplying of the maintenance dose is performed by a pump having a
pump tube displacement and which is caused to operate for a run time determined
20 according to equation (2).

$$RT = ((K)(MD)/(PRPM \times PTD)) \quad (2)$$

where

RT = Run time of pump (sec)
PRPM = Pump speed (RPM)
25 PTD = Pump tube displacement (ml)/pump revolution
K = 1776 ((sec·ml)/(min·oz)), and
MD is defined as in equation (1)

2 A method according to claim 1 wherein the source of the chemical is an aqueous
30 solution of the water treatment chemical

3 A method according to claim 2 wherein the solution has about 0.5 wt.% (active) to
about 80 wt.% (active) water treatment chemical

35 4 A method according to any one of the preceding claims wherein the pump is
caused to operate by a computer programmed according to equation (2)

- 5 A method according to any one of claims 1 to 4 wherein the water treatment chemical is selected from the group consisting of algicides, sanitizers, oxidizers, chelating agents, pH control agents, corrosion inhibitors and stabilizers
- 5 6 A method according to any one of claims 1 to 4 wherein the water treatment chemical is selected from the group consisting of chlorine dioxide, lithium hypochlorite, sodium hypochlorite, (poly(hexamethylene biguanide) hydrochloride), 1,3-bromo-chloro-dimethylhydantoin, and 1,3-dibromodimethylhydantoin, hydrogen peroxide, potassium monopersulfate, sodium perborate, sodium percarbonate, copper sulphate, copper citrate, 10 copper EDTA (ethylene diaminetetraacetic acid), copper gluconate, colloidal silver, silver nitrate, poly(oxyethylene (dimethylimino) ethylene (dimethylimino) ethylene dichloride), sodium dimethyldithiocarbamate, 2-chloro-4,6-bis(ethylamino)-5-triazine, zinc chloride, zinc oxide, and benzyl ammonium chloride
- 15 7 A method according to any one of claims 1 to 4 wherein the water treatment chemical is selected from the group consisting of alkali metal hypochlorite, alkaline earth metal hypochlorite, chlorinated isocyanurates, halogenated hydantoins, alkali metal perborates, alkali metal percarbonates, copper salts, silver salts, quaternary ammonium compounds, polyquaternary ammonium compounds, zinc salts, chelating agents, 20 fungicides, pH control agents, corrosion inhibitors, and stabilizers
- 8 A method according to any one of claims 1 to 4 wherein the water treatment chemical is hydrogen peroxide
- 25 9 A method according to claim 3 wherein the water treatment chemical is sanitizer added in a maintenance dose of about 0.1 ppm/day to about 6 ppm/day
- 10 A method according to claim 3 wherein the water treatment chemical is sanitizer added in a maintenance dose of about 1 ppm/day to about 3 ppm/day
- 30 11 A system for treating a volume of water to maintain a predetermined amount of a water treatment chemical in the volume of water over a time period comprising, a pump having a pump tube displacement cooperatively connected to a computer for control of the pump, a source of chemical for supply to the pump for delivery by the pump to a volume of water, causing the pump to operate for a time sufficient to supply an amount of water 35 treatment chemical to the volume of water sufficient to maintain about the predetermined amount of water treatment chemical in the volume of water over the time period, wherein the pump is caused to operate for a run time (RT) calculated as the quotient of

$$((K) (MD) / (PRPM \times PTD))$$

where

- RT = Run time of pump (sec)
 PRPM = Pump speed (RPM)
 5 PTD = Pump tube displacement (ml)/pump revolution
 K = 1776 ((sec-ml)/(min-oz)), and
 MD = (PV) (DC) where
 MD = Maintenance dose of water treatment chemical
 PV = Volume of water to be treated
 10 DC = Consumption amount of water treatment chemical over the
 time period

12 A system according to claim 11 wherein the source of the chemical is an aqueous solution of the water treatment chemical

13 A system according to claim 12 wherein the solution has about 1 wt.% (active) to about 80 wt.% (active) water treatment chemical

14 A system according to any one of claims 11 to 13 wherein the pump is caused to operate by a computer programmed according to equation (2)

15 A system according to any one of claims 11 to 14 wherein the water treatment chemical is selected from the group consisting of algicides, sanitizers, oxidizers, chelating agents, pH control agents, corrosion inhibitors and stabilizers

16 A system according to any one of claims 11 to 14 wherein the water treatment chemical is selected from the group consisting of chlorine dioxide, alkali metal hypochlorite, alkaline earth metal hypochlorite, chlorinated isocyanurates, (poly(hexamethylene biguanide) hydrochloride)halogenated hydantoins, hydrogen peroxide, potassium monopersulfate, chlorine dioxide, alkali metal perborates, alkali metal percarbonates, copper salts, copper sulphate, copper citrate, copper EDTA (ethylene diaminetetraacetic acid), copper gluconate, colloidal silver, silver salts, silver nitrate, quaternary ammonium compounds, polyquaternary ammonium compounds, poly(oxyethylene (dimethylimino) ethylene (dimethylimino) ethylene dichloride), sodium dimethyldithiocarbamate, 2-chloro-4,6-bis(ethylamino)-5-triazine, zinc salts, zinc chloride, zinc oxide, benzyl ammonium chloride, chelating agents, fungicides, pH control agents, corrosion inhibitors, and stabilizers

17 A system according to any one of claims 11 to 14 wherein the water treatment chemical is selected from the group consisting of chlorine dioxide, lithium hypochlorite, sodium hypochlorite, (poly(hexamethylene biguanide) hydrochloride), 1,3-bromo-chloro-dimethylhydantoin, and 1,3-dibromodimethylhydantoin, hydrogen peroxide, potassium monopersulfate, sodium perborate, sodium percarbonate, copper sulphate, copper citrate, copper EDTA (ethylene diaminetetraacetic acid), copper gluconate, colloidal silver, silver nitrate, poly(oxyethylene (dimethylimino) ethylene (dimethylimino) ethylene dichloride), sodium dimethyldithiocarbamate, 2-chloro-4,6-bis(ethylamino)-5-triazine, zinc chloride, zinc oxide, and benzyl ammonium chloride

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18 A system according to any one of claims 11 to 14 wherein the water treatment chemical is selected from the group consisting of alkali metal hypochlorite, alkaline earth metal hypochlorite, chlorinated isocyanurates, halogenated hydantoins, alkali metal perborates, alkali metal percarbonates, copper salts, silver salts, quaternary ammonium compounds, polyquaternary ammonium compounds, zinc salts, chelating agents, fungicides, pH control agents, corrosion inhibitors, and stabilizers.

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19 A system according to any one of claims 11 to 14 wherein the water treatment chemical is hydrogen peroxide

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20 A system according to claim 13 wherein the water treatment chemical is sanitizer added in a maintenance dose of about 0.1 ppm/day to about 6 ppm/day

21 A system according to claim 13 wherein the water treatment chemical is sanitizer added in a maintenance dose of about 1 ppm/day to about 3 ppm/day

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22 A system for treating a volume of water to maintain a predetermined amount of a water treatment chemical in the volume of water over a time period comprising, a device for delivering a water treatment chemical to a volume of water, causing the device to operate for a time sufficient to deliver a maintenance dose of water treatment chemical sufficient to maintain about the predetermined amount of water treatment chemical in the volume of water over the time period, wherein the maintenance dose is calculated according to equation (1):

30

$$MD = (PV)(DC) \quad (1)$$

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where

MD = Maintenance dose of water treatment chemical

PV = Volume of water to be treated

DC = Consumption amount of water treatment chemical over the time period

23 A method for treating a volume of water to maintain a predetermined amount of a water treatment chemical in the volume of water over a time period comprising, delivering a water treatment chemical to a volume of water by a device controlled by a computer, operating the device for a time sufficient to deliver a maintenance dose of water treatment chemical sufficient to maintain about the predetermined amount of water treatment chemical in the volume of water over the time period, wherein the maintenance dose is calculated according to equation (1).

$$MD = (PV)(DC) \quad (1)$$

where

10 MD = Maintenance dose of water treatment chemical
PV = Volume of water to be treated
DC = Consumption amount of water treatment chemical over the time period

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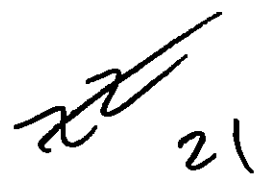
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(54) Título METODO DE TRATAMIENTO DE AGUA

57) Resumen La invención se relaciona con un método de tratamiento de cuerpos de agua tal como piscinas recreativas, spas y bañeras calientes con dosis de mantenimiento de químicos para el tratamiento del agua para lograr limpieza consistente y niveles estéticamente agradables de propiedades tales como la turbidez. La cantidad de la dosis de mantenimiento de base en el volumen de agua a tratar con el fin de lograr agua clara e higiénica. El método puede automatizarse para un tratamiento preciso, consistente y seguro del agua tal como el que se encuentra en piscinas de natación, spas o bañeras calientes.



MÉTODO DE TRATAMIENTO DE AGUA

Esta invención se refiere a metodos para desinfeccion y aclaración de agua. Piscinas recreativas tales como piscinas de natacion, saunas ("*spas*") y tinas calientes brindan gran cantidad de placer y bienestar. La medida del bienestar depende de la calidad del agua. Con el fin de garantizar el bienestar y la seguridad a los usuarios de estas piscinas, es importante que el agua se trate adecuadamente, de modo que sea esteticamente agradable en términos de sabor, color, turbiedad y olor. Además, el tratamiento apropiado es importante de manera que el agua tenga un pH adecuado y sea ecologicamente segura, asi como que esté efectivamente libre de patógenos y productos quimicos, que puedan causar enfermedades.

Los metodos convencionales de tratamiento de agua en piscinas recreativas utilizan productos quimicos para el tratamiento de agua, tales como oxidantes, desinfectantes, algicidas y soluciones amortiguadoras de pH. Por lo general, los productos químicos se miden y se agregan manualmente al agua como parte de un programa general de mantenimiento del agua. En tal programa se miden en intervalos regulares diferentes parametros de calidad del agua. Cuando un parámetro es inaceptable, se mide y se agrega manualmente al agua una cantidad apropiada de producto quimico para el tratamiento de agua. Al actuar asi, el usuario se expone en forma no deseada al producto quimico concentrado.

Igualmente se han agregado mezclas de productos quimicos al agua de piscinas recreativas. La adición de mezclas de productos quimicos para aumentar la claridad del agua se muestra en la Patente de los Estados Unidos No 5,501,802. Esta patente divulga una mezcla que incluye desinfectante de biguanida de polihexametileno, oxidantes de sal de persulfato y agentes quelantes. Las Patentes de los Estados Unidos Nos 5,514,287 y 5,478,482 divulgan una composicion y un metodo para controlar el crecimiento microbiano en sistemas de recirculacion de agua. La composicion incluye un donador de boro soluble, un desinfectante/algicida de halógeno/boro y un aclarador oxidante que



comprende un compuesto de cloro, un oxidante no halogeno y una fuente de boro

La Patente de los Estados Unidos No 4,846,979 divulga una composición algicida para tratar piscinas de natación y saunas La composicion algicida incluye un bromuro de metal alcalino, metal alcalinoterreo o amonio y un oxidante

Un desinfectante popular para el tratamiento de agua se basa en la biguanida polimérica descrita en la Patente de los Estados Unidos No 4,014,676 El uso de guanidas polimericas tales como BAQUACIL Sanitizer and Algistat, comercializados por Avecia Inc , son populares porque no ocasionan irritacion de los ojos, la cual es comun con el uso del cloro

Agua tratada con BAQUACIL® Sanitizer and Algistat puede tratarse asimismo con un algicida separado para combatir algas Oxidantes como aquellos que incluyen peroxido de hidrogeno como componente activo pueden agregarse tambien al agua tratada para oxidar compuestos orgánicos en el agua, con el fin de aumentar la claridad Un ejemplo de tal oxidante es BAQUACIL® Shock and Oxidizer (de Avecia Inc) BAQUACIL® Shock and Oxidizer es una solución acuosa que incluye 27.5% de peróxido de hidrogeno

Tipicamente los consumidores tratan el agua de piscinas, saunas y tinas calientes con productos quimicos tales como desinfectantes, oxidantes y algicidas Debido a complejidades tales como los diferentes tiempos especificados para dosificar diversos productos quimicos para el tratamiento de agua, dificultades en medir exactamente las dosis, exposicion a productos químicos, así como el costo de los productos quimicos, los consumidores tienden a evitar tratar el agua hasta que ocurren problemas tales como opacidad y acumulación de algas

Por lo tanto, existe una necesidad de un metodo que evite estas complejidades y permita el tratamiento fácil del agua, tal como la que se encuentra en piscinas recreativas

La invencion consigue la introducción continua y controlada de

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productos químicos desinfectantes y aclaradores en el agua para mantener un nivel residual deseado de aquellos productos químicos. El método puede emplearse en un sistema dosificador automatizado.

En un primer aspecto, la invención se relaciona con un método de tratamiento de cuerpos de agua, tales como piscinas recreativas, saunas y tinas calientes, con dosis de mantenimiento de productos químicos para el tratamiento de agua, con el fin de lograr una desinfección consistente y niveles estéticamente agradables de propiedades, tales como la (eliminación de la) turbiedad. La cantidad de la dosis de mantenimiento se basa en el volumen de agua por tratar, con el fin de obtener un agua higiénica y clara. Más particularmente, en este aspecto se trata un volumen de agua para mantener una cantidad predeterminada de un producto químico para el tratamiento de agua. El método implica determinar una cantidad de un producto químico para el tratamiento de agua a preservarse en un volumen de agua por tratar. Una dosis de mantenimiento del producto químico se agrega al volumen de agua para mantener aproximadamente la cantidad del producto químico en el agua durante un período deseado de tiempo. La dosis de mantenimiento se determina de la ecuación $MD = (PV)(DC)$ donde MD = Dosis de mantenimiento de producto químico para el tratamiento de agua, PV = Volumen de agua por tratar, y DC = Cantidad consumida de producto químico para el tratamiento de agua durante ese período de tiempo deseado. La dosis de mantenimiento puede suministrarse por una bomba con un desplazamiento de tubo y que opera durante un tiempo de operación RT determinado por

$$RT = ((K) (MD)/(PRPM \times PTD))$$

donde

RT = Tiempo de operación de la bomba (seg)

PRPM = Velocidad de la bomba (RPM)

PTD = Desplazamiento del tubo de la bomba
(ml)/revolución de la bomba

K = 1776 ((seg - ml)/(min - oz)), y

MD se define como más arriba.

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En otro aspecto, la invencion se refiere a un sistema para tratar un volumen de agua para mantener en el volumen de agua una cantidad predeterminada de un producto quimico para el tratamiento de agua. El sistema incluye un dispositivo para aplicar a un volumen de agua un producto quimico para el tratamiento de agua, donde el dispositivo se controla preferiblemente por un computador. El dispositivo se hace operar durante un tiempo suficiente para aplicar una dosis de mantenimiento de producto quimico para el tratamiento de agua, suficiente para mantener en el volumen de agua la cantidad predeterminada de producto quimico para el tratamiento de agua durante un período de tiempo deseado. La dosis de mantenimiento $MD = (PV)(DC)$ donde MD = Dosis de mantenimiento de producto quimico para el tratamiento de agua, PV = Volumen de agua por tratar, y DC = Cantidad consumida de producto químico para el tratamiento de agua durante ese periodo de tiempo deseado.

El metodo de la invención alcanza ventajas significativas. El metodo posibilita el mantenimiento en el agua de una cantidad residual deseada de un producto quimico para el tratamiento de agua, tal como un desinfectante, oxidante o algicida, para controlar bacterias y algas fastidiosas y lograr niveles consistentemente bajos de turbiedad. La dosis de mantenimiento puede agregarse sin la necesidad de medir primero en el agua la cantidad de un producto químico para el tratamiento de agua, antes de añadir la dosis de mantenimiento de producto quimico para el tratamiento de agua, como es el caso con las adiciones manuales del producto quimico.

El metodo logra la aclaracion del agua en conjuncion con un programa general existente de mantenimiento del agua, sin afectar negativamente otros parametros de calidad del agua. Ventajosamente y sobre una base consistente, la invención consigue una mejor claridad del agua y cantidades reducidas de algas.

El metodo puede automatizarse para reducir al minimo la exposicion del consumidor a los productos químicos y para evitar errores de medicion, que producen una dosificacion incorrecta de los productos quimicos. La tecnologia existente, tal como la tecnologia existente de dosificación

automatica, requiere que el cliente calcule primero la dosis de productos quimicos apropiada para el tratamiento efectivo de sus piscinas, saunas y similares. La dosis de mantenimiento de acuerdo con la invencion evita las inexactitudes de una dosificacion por debajo/por encima del nivel, asociadas con adiciones manuales de productos quimicos para el tratamiento de agua. La dosificacion de mantenimiento automatizada por un dispositivo tal como una bomba programable, como, por ejemplo, en el Sistema de Dosificación Automatizada BAQUACIL AD™ de Avecia Inc, provee un método seguro, consistente y exacto de dosificacion de productos quimicos para el tratamiento de agua.

Aunque el método puede usarse para tratar piscinas, saunas, tinas calientes y similares, es particularmente apropiado para tratar piscinas recreativas. La invención, además del tratamiento de agua recreativa, tal como piscinas de natacion y tinas calientes, puede usarse en una variedad de otras aplicaciones de tratamiento de agua. Ejemplos de estas aplicaciones incluyen tratamiento de agua domestica, tratamiento de agua comunitaria, tratamiento de agua industrial, agricultura, reutilización de agua e inyeccion de aguas subterráneas.

Los productos quimicos para el tratamiento de agua que pueden usarse en el metodo incluyen, pero no se limitan a, desinfectantes, oxidantes y algicidas. Los desinfectantes que pueden emplearse en el metodo incluyen, pero no se limitan a, biocidas oxidantes y biocidas no oxidantes.

Los biocidas oxidantes que pueden utilizarse incluyen, pero no se limitan a, dióxido de cloro, hipoclorito de metal alcalino tales como hipoclorito de litio e hipoclorito de sodio, hipocloritos de metal alcalinoterreo, tales como hipoclorito de calcio, isocianuratos clorados, dicloro-s-triazinatrina de sodio, tricloro-s-triazinatrina y dicloro-s-triazinatrina de potasio, e hidantoinas halogenadas tales como 1,3-bromo-cloro-dimetilhidantoína, y 1,3-dibromodimetilhidantoína.

Los biocidas no oxidantes que pueden usarse incluyen, pero no se limitan a, (clorhidrato de biguanida de poli(hexametileno)) tal como BAQUACIL de Avecia, preferiblemente (clorhidrato de biguanida de

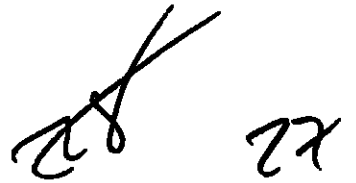
poli(hexametileno))

Los oxidantes que pueden usarse en el metodo incluyen, pero no se limitan a, peróxidos tales como peróxido de hidrógeno, monopersulfato de potasio, dióxido de cloro, perboratos de metal alcalino, tales como agentes de liberacion de peroxido como los ilustrados por perborato de sodio, persulfato de sodio, monopersulfato de potasio y percarbonatos de sodio Preferiblemente, el oxidante es peroxido de hidrógeno

Los algicidas que pueden usarse en el método incluyen, pero no se limitan a, sales de cobre tales como sulfato de cobre, citrato de cobre, EDTA (ácido etilen diaminotetraacético) de cobre, y gluconato de cobre, TEA (trietanolamina) de cobre, plata coloidal, sales de plata tales como nitrato de plata, compuestos de amonio cuaternario o policuaternario tales como poli(oxietilen (dimetilimino) etilen (dimetilimino) etilen bicloruro) obtenible de Buckman Corp, bajo la marca comercial WSP, dimetilditioicarbamato de sodio, 2-cloro-4,6-bis(etilamino)-5-triazina, sales de zinc tales como cloruro de zinc y óxido de zinc, cloruro de bencilalconio, obtenible de Lonza Corp Preferiblemente, el algicida es cloruro de bencilalconio

Otros productos químicos que pueden emplearse en el metodo incluyen, por ejemplo, agentes quelantes tales como ácido etilen diaminotetraacetico y trietanolamina, fungicidas, agentes de control de pH (ácidos y bases), inhibidores de corrosion y estabilizantes

Una cantidad inicial, predeterminada, de un producto quimico para el tratamiento de agua, tal como desinfectante, oxidante y algicida se agrega al agua Tipicamente, esta cantidad inicial es suficiente para inactivar contaminantes biologicos en el volumen de agua sometida a tratamiento Cada desinfectante, oxidante y algicida puede proveerse en la forma de líquido, polvo o gas Donde se emplea una solucion acuosa del producto quimico para el tratamiento de agua, la solución acuosa tiene alrededor de 1% a alrededor de 80% de producto quimico (activo) para el tratamiento de agua En consecuencia, donde se emplea un desinfectante, la solución acuosa tiene alrededor de 1% en peso a alrededor de 80% en peso de



desinfectante (activo) Analogamente, donde se emplea un oxidante, la solución acuosa tiene alrededor de 0.5% en peso a alrededor de 80% en peso de oxidante (activo) De igual manera pueden utilizarse mezclas de producto químico para el tratamiento de agua

La cantidad inicial, predeterminada, de producto químico para el tratamiento de agua es seguida por una o más dosis de mantenimiento del producto químico para el tratamiento de agua Las dosis de mantenimiento se agregan en cantidades suficientes para mantener en el agua una cantidad deseada del producto químico para el tratamiento de agua durante un periodo de tiempo deseado, tal como 24 horas La dosis de mantenimiento puede ser la misma o diferente de la cantidad inicial de producto químico para el tratamiento de agua, agregado al agua Preferiblemente, dosis de mantenimiento de producto químico individual para el tratamiento de agua se añaden al volumen de agua. Del mismo modo, mezclas de productos químicos para el tratamiento de agua pueden agregarse como una dosis de mantenimiento

La dosis de mantenimiento de producto químico para el tratamiento de agua, añadida al volumen de agua sometida a tratamiento, se calcula de acuerdo con la ecuación (1)

$$MD = (PV)(DC) \quad (1)$$

donde

MD = Dosis de mantenimiento de producto químico para el tratamiento de agua (oz.), agregada para compensar la pérdida de producto químico para el tratamiento de agua durante un periodo dado de tiempo

PV = Volumen de agua por tratar (galones)

DC = Cantidad consumida de producto químico para el tratamiento de agua en el volumen de agua (oz de producto químico para el tratamiento de agua/1000 galones de agua) durante el periodo de tiempo dado

DC se determina midiendo el consumo de un producto químico

particular para el tratamiento de agua, en el tipo de sistema de agua por tratar durante un periodo dado de tiempo. El consumo del producto químico para el tratamiento de agua puede determinarse usando técnicas analíticas conocidas.

Las dosis de mantenimiento de productos químicos para el tratamiento de agua se añaden en intervalos de tiempo seleccionados, tales como cada 24 horas, para mantener en el agua una cantidad deseada de producto químico para el tratamiento de agua. Dosis de mantenimiento de desinfectante tal como BAQUACIL® Sanitizer and Algistat varían típicamente desde alrededor de 0.1 ppm/día a alrededor de 6.0 ppm/día, preferiblemente alrededor de 1.0 ppm/día a alrededor de 3.0 ppm/día. Las dosis de mantenimiento pueden agregarse basándose en una determinación única de DC y evitando simultáneamente la necesidad de volver a medir en el agua la cantidad de producto químico para el tratamiento de agua.

La dosis inicial de oxidante se añade al volumen de agua en una cantidad suficiente para oxidar material orgánico, presente inicialmente en el volumen de agua. A continuación se agregan las dosis de mantenimiento de oxidante para mantener esa cantidad de oxidante. Dosis de mantenimiento de oxidantes tales como BAQUACIL® Shock and Oxidizer de Avecia varían por lo general desde alrededor de 0.5 ppm/día a alrededor de 10.0 ppm/día.

La dosis inicial de algicida se agrega al volumen de agua en una cantidad suficiente para impedir el crecimiento de algas o efloramiento ("*bloom*"), determinados visualmente. Las dosis de mantenimiento de algicida se agregan en cantidades suficientes para impedir el crecimiento de algas o efloramiento durante un período de 24 horas, determinados visualmente.

El método de tratamiento de agua puede realizarse manualmente y, además, puede automatizarse. El método puede programarse en un dispositivo, tal como una bomba, para aplicar una dosis de mantenimiento. El método puede automatizarse mediante el uso de un dispositivo de suministro, tal como un dispensador de tableta, dispensador de polvo,

alimentador por erosion, alimentador de inyector, alimentador de gas y bombas, preferiblemente, una bomba programable. El dispositivo, tal como una bomba, puede programarse en tiempos específicos durante intervalos de operación específicos para agregar al volumen de agua sometida a tratamiento dosis de mantenimiento de productos químicos para el tratamiento de agua.

El tiempo de operación durante el cual se opera la bomba para aplicar una dosis de mantenimiento se calcula de acuerdo con la ecuación (2)

$$RT = ((K) (MD)/(PRPM \times PTD)) \quad (2)$$

donde

RT = Tiempo de operación de la bomba (seg) para aplicar MD

PRPM = Velocidad de la bomba (RPM)

PTD = Desplazamiento del tubo de la bomba (ml)/revolucion de la bomba

K = Constante de conversión (1776 ((seg -ml)/(min-oz)))

MD se define como en la ecuación (1)

Para ilustrarla, asumase un volumen de la piscina (PV) de 10 000 galones, y que la (DC) del producto químico para el tratamiento de agua en la piscina es 0.125 oz./1 000 gal/día. Sustituyendo en la Ec (1), MD se calcula como 1.25 oz. Sustituyendo en la Ec (2), donde PRPM=20 y PTD=2, el RT de la bomba se calcula como 55.5 segundos.

Una bomba programable útil en el método de tratamiento de agua es el Sistema de Dosificación Automatizada BAQUACIL AD™ de Avecia Inc. El Sistema de Dosificación Automatizada BAQUACIL AD™ incluye una unidad dispensadora que emplea dos bombas. Las bombas se controlan por un chip de computador programado de acuerdo con las Ecuaciones (1) y (2).

De igual manera puede emplearse una bomba programable para agregar una dosis inicial de un producto químico para el tratamiento de agua, tal como desinfectante, oxidante y algicida a sistemas de agua.

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acabada de llenar (o recién convertida), así como para administrar dosis de reposición ("*top-up doses*") de desinfectante, algicida y oxidante a volúmenes establecidos de agua, para obtener una química deseada.

Para ilustrar los beneficios de la invención, se trataron un conjunto de 16 piscinas recreativas de prueba y un conjunto de cuatro piscinas recreativas de control, para comparar el efecto de dosis de mantenimiento de productos químicos de tratamiento de agua sobre el control de la claridad del agua y las algas versus dosificación manual convencional semanal – mensual de los mismos productos químicos. Los tratamientos se hacen asimismo para evaluar adiciones automatizadas de dosis de mantenimiento, con el fin de confirmar que la cantidad residual de producto químico para el tratamiento de agua, tal como desinfectante, puede mantenerse por encima de 30 ppm.

Las adiciones automatizadas de dosis de mantenimiento a las 16 piscinas de prueba se realizaron usando una bomba programable, como la incluida en el Sistema de Dosificación Automatizada BAQUACIL AD™ de Avecia. Las cuatro piscinas de control se tratan manualmente con dosis de mantenimiento. Cada piscina de prueba se trata con una dosis inicial, predeterminada, de desinfectante, oxidante y algicida usando el Sistema de Dosificación Automatizada BAQUACIL AD™.

Una dosis inicial del desinfectante BAQUACIL AD™ Sanitizer and Algistat (20% PHMB, clorhidrato de poliminimidocarboniliminimidocarbonil hexametileno, US EPA Reg No 72674-19) de Avecia Inc, se agrega como se indica más arriba en la cantidad de 64 oz./10 000 galones para obtener 50 ppm del desinfectante en cada piscina de prueba. Análogamente, una dosis inicial del oxidante BAQUACIL AD™ Shock and Oxidizer (27.5% de peróxido de hidrógeno) de Avecia Inc, se agrega como se indica más arriba en la cantidad de 128 oz./10 000 galones para obtener 100 ppm del oxidante en cada piscina de prueba. Una dosis inicial del algicida BAQUACIL AD™ Algicide 10 (9.96% de cloruro de n-alquil (C₁₄, 60%, C₁₆, 30%, C₁₂, 5%, C₁₈, 5%) dimetil bencil amonio, cloruro de dialquil (C₁₄, 60%, C₁₆, 30%, C₁₂, 5%,

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C₁₈, 5%) metil bencil amonio en agua, US EPA Reg No 6836-247-72674) de Avecia Inc , se agrega como se indica más arriba en la cantidad de 32 oz (10% activo)/10 000 galones para obtener 2 4 ppm del algicida en cada piscina de prueba

Luego de haber agregado las dosis iniciales, cada una de las piscinas de prueba se trata en intervalos de 24 horas con dosis de mantenimiento del desinfectante, oxidante y algicida usando una bomba programable de acuerdo con la ecuación (2) En el Sistema Automatizado BAQUACIL AD™ se incluye una bomba programable Cada piscina de prueba recibe una dosis de mantenimiento de 1 25 onzas de BAQUACIL AD™ Sanitizer and Algistat oxidizer por 10 000 galones de agua de la piscina, 4 6 onzas de BAQUACIL AD™ Shock and Oxidizer por 10 000 galones de agua de la piscina, y 1 14 onzas de algicida BAQUACIL AD™ Algicide 10 por 10 000 galones de agua de la piscina La dosis de mantenimiento del desinfectante esta en la forma de una solucion acuosa de 20% en peso, la dosis de mantenimiento del oxidante está en la forma de una solucion acuosa de 27 5% en peso, y la dosis de mantenimiento de algicida está en la forma de una solucion acuosa de 10% en peso

Cada piscina de control se trata con una dosis inicial, predeterminada, de los productos quimicos para tratamiento de agua desinfectante, oxidante y algicida Las dosis iniciales se miden y agregan manualmente vertiendo los productos quimicos alrededor del perímetro de la piscina La dosis inicial del desinfectante BAQUACIL® Sanitizer and Algistat (20% PHMB, cloruro de poliminoimidocarboniliminoimidocarbonil hexametileno, EPA Reg No 72674-19) de Avecia Inc , se añade manualmente a cada una de las piscinas de control para obtener 50 ppm del desinfectante en cada piscina Análogamente, la dosis inicial del oxidante BAQUACIL® Shock and Oxidizer (27 5% de peroxido de hidrogeno) de Avecia Inc , se agrega para lograr 100 ppm de oxidante en cada piscina de control La dosis inicial del algicida BAQUACIL® Algicide (49 8% de cloruro de n-alquil (C₁₄, 60%, C₁₆, 30%, C₁₂, 5%, C₁₈, 5%) dimetil bencil amonio, 0 2% de cloruro de dialquil (C₁₄, 60%, C₁₆, 30%, C₁₂, 5%, C₁₈, 5%) metil bencil amonio en

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agua EPA Reg No 72674-20) de Avecia Inc , se añade para obtener 20 ppm de algicida en cada piscina de control

Dosis de mantenimiento de BAQUACIL® Sanitizer se agregan manualmente cada 10-14 días a las piscinas de control Dosis de mantenimiento de BAQUACIL® Sanitizer se añaden cuando el nivel medido de BAQUACIL cae a, 30 ppm, o por debajo de ese nivel El BAQUACIL® Sanitizer se agrega en una cantidad para obtener 50 ppm del desinfectante en el volumen de la piscina Dosis de mantenimiento de oxidante se agregan manualmente en la cantidad de 128 onzas de oxidante por 10 000 galones de volumen de la piscina una vez al mes Dosis de mantenimiento de algicida se añaden manualmente en la cantidad de 125 onzas de algicida por 10 000 galones de volumen de la piscina una vez por semana

Todas las piscinas se examinan un mínimo de tres veces al mes Se toman muestras de agua de cada piscina y se analizan para detectar cantidades residuales de desinfectante y oxidante Se evaluaron igualmente los parametros de equilibrio hidrico ("*water balance parameters*"), temperatura y turbiedad del agua Los niveles ppm del oxidante y el desinfectante en el agua de la piscina se miden usando Sistema de Analisis de Agua PINPOINT™ Portable Lab de Avecia Inc La turbiedad se mide usando un Turbidímetro Hach Corp 2100P Las algas y la claridad del agua se evaluan visualmente Las escalas de calificación usadas para evaluación de las algas y la claridad del agua se muestran en las Tablas 1 y 2

Evaluación de la Cantidad de Desinfectante Residual

Las cantidades de desinfectante residual se miden un minimo de tres veces al mes Las cantidades promedio de desinfectante residual se calculan para las piscinas de prueba y para las piscinas de control Las cantidades promedio de desinfectante residual de las piscinas de prueba es 36.6 ± 6.0 ppm, comparadas con un promedio de 36.0 ± 4.0 ppm para las piscinas de control Esto muestra que las dosis de mantenimiento

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calculadas por el metodo de la invención como en las Ecuaciones (1) y (2), y que pueden agregarse en una manera automatizada, mantienen cantidades de desinfectante en las piscinas de prueba equivalentes a los niveles obtenidos siguiendo una dosificación manual semanal, para mantener un nivel del desinfectante en una cantidad de más de 30 ppm

Evaluación de la Concentración de las Algas

La evaluación visual de la cantidad de algas presentes en una piscina se conduce un minimo de tres veces al mes y se le asigna una calificación entre 0 y 4 La escala de calificación usada se muestra en la Tabla 1

Tabla 1 Escala de Calificación para la Evaluación Visual de las Algas

Calificación	Descripción de las algas
0	Sin rastro de algas visibles en ninguna parte de la piscina
1	Cantidades trazadoras presentes en los lados o en el fondo de la piscina
2	Pequeños parches fácilmente observados en los lados de la piscina
3	Parches grandes fácilmente observados en los lados y en el fondo de la piscina
4	25% o mas de los lados y el fondo de la piscina cubiertos por algas

Una calificación aceptable de algas es 1 ó menos La calificación de las algas refleja la cantidad de algas presentes Una calificación de "0" significa que no existen signos visibles de algas, mientras que una calificación de "4" significa que la piscina está plagada de algas que cubren >25% de las superficies visibles de la piscina, o que la columna de agua es de un fuerte color verde debido a algas de plancton El porcentaje de piscinas que tienen calificaciones aceptables de algas se expone en la Tabla A

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Tabla A Porcentajes de Calificación de Algas

Sistema	Porcentaje de Calificación donde las calificaciones ≤ 1	Porcentaje de Calificación donde las calificaciones >1
Piscinas de prueba dosificadas con el sistema de dosificación automatizada BAQUACIL AD™	89 0	11 0
Piscinas de control	75 0	25 0

Como se muestra en la Tabla A, el método de la invención provee un control superior de todos los tres tipos de algas, incluida la diatomea *Chlorella spp* (algas verdes), comun a las piscinas de natación

Evaluacion de las Pruebas de Claridad y Turbiedad

Se conduce una evaluacion visual de la claridad del agua un minimo de tres veces al mes y se asigna una calificación de la claridad del agua entre 0 y 4 La calificación de claridad refleja la turbiedad del agua Una calificación de "0" significa que el agua es cristalina, mientras que una calificación de "4" significa que la piscina es tan turbia, que es imposible percibir la profundidad real La escala de calificación usada para evaluar visualmente la claridad del agua se expone en la Tabla 2

Tabla 2 Escala de Calificación de la Evaluacion Visual de la Claridad del Agua

Calificación	Descripción de la Claridad del Agua
0	Agua resplandecientemente clara
1	Agua aparece turbia, presencia de una ligera opacidad
2	Desagüe principal es visible, pero no distinguible
3	Fondo del extremo poco profundo visible, el desagüe principal no
4	No puede verse el fondo en el extremo poco profundo

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Una calificación aceptable de claridad es 1 ó menos El porcentaje de piscinas que tienen lecturas de calificación de claridad aceptable se expone en la Tabla B

Tabla B Calificaciones Porcentuales de Claridad Aceptables e Inaceptables

Sistema	Calificaciones Aceptables ≤ 1 (%)	Calificaciones Inaceptables >1 (%)
Piscinas de prueba dosificadas con el sistema de dosificación automatizada BAQUACILAD™	95 5	4 5
Control (dosificadas manualmente)	75 0	25 0

Las piscinas de prueba tratadas con dosis de mantenimiento de acuerdo con el método de la invención tienen una incidencia mucho menor de agua opaca que las piscinas de control, es decir, aquellas dosificadas manualmente

El valor de turbiedad promedio para las piscinas de prueba es 0 7 NTU (Unidades de Turbiedad Nefelométrica) Este valor de turbiedad promedio corresponde a una calificación de opacidad de 0 y es excelente En comparación, el valor de turbiedad promedio para las piscinas de control, que no se tratan diariamente, es mucho más alto con 1 1 NTU La menor turbiedad promedio para las piscinas de prueba se correlaciona bien con la evaluación visual

REIVINDICACIONES

1 Un metodo de tratar un volumen de agua para mantener una cantidad predeterminada de un producto quimico para el tratamiento de agua en el volumen de agua durante un periodo de tiempo, que comprende determinar una cantidad de un producto quimico para el tratamiento de agua a preservarse en un volumen de agua por tratar, calcular una dosis de mantenimiento del producto quimico a agregarse al volumen de agua, para mantener aproximadamente la cantidad del producto quimico en el agua durante el periodo de tiempo, proveer una fuente del producto quimico y suministrar la dosis de mantenimiento del producto quimico para el tratamiento de agua al volumen de agua, en donde la dosis de mantenimiento se calcula de acuerdo con la ecuación (1)

$$MD = (PV)(DC) \quad (1)$$

donde

MD = Dosis de mantenimiento de producto quimico para el tratamiento de agua

PV = Volumen de agua por tratar

DC = Cantidad consumida de producto químico para el tratamiento de agua durante el periodo de tiempo y

en donde el suministro de la dosis de mantenimiento se realiza por una bomba con un desplazamiento del tubo y que se hace operar durante un tiempo de operación, determinado de acuerdo con la ecuación (2)

$$RT = ((K) (MD)/(PRPM \times PTD)) \quad (2)$$

donde

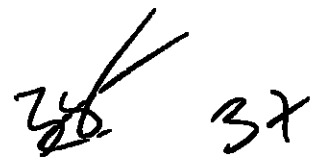
RT = Tiempo de operacion de la bomba (seg)

PRPM = Velocidad de la bomba (RPM)

PTD = Desplazamiento del tubo de la bomba (ml)/revolucion de la bomba

K = 1776 ((seg -ml)/(min-oz)), y

MD se define como en la ecuación (1)



2 Un metodo de acuerdo con la reivindicación 1, en donde la fuente del producto químico es una solución acuosa del producto químico para el tratamiento de agua

3 Un método de acuerdo con la reivindicación 2, en donde la solución tiene alrededor de 0.5% en peso (activo) a alrededor de 80% en peso (activo) de producto químico para el tratamiento de agua

4 Un método de acuerdo con una cualquiera de las reivindicaciones precedentes en donde se hace operar la bomba por un computador programado de acuerdo con la ecuación (2)

5 Un metodo de acuerdo con una cualquiera de las reivindicaciones 1 a 4, en donde el producto químico para el tratamiento de agua se selecciona del grupo conformado por algicidas, desinfectantes, oxidantes, agentes quelantes, agentes de control de pH, inhibidores de corrosión y estabilizantes

6 Un metodo de acuerdo con una cualquiera de las reivindicaciones 1 a 4, en donde el producto químico para el tratamiento de agua se selecciona del grupo conformado por dióxido de cloro/hipoclorito de litio, hipoclorito de sodio, (clorhidrato de biguanida de poli(hexametileno)), 1,3-bromo-cloro-dimetilhidantoina, y 1,3-dibromodimetilhidantoina, peróxido de hidrogeno, monopersulfato de potasio, perborato de sodio, percarbonato de sodio, sulfato de cobre, citrato de cobre, EDTA (ácido etilen diaminotetraacético) de cobre, gluconato de cobre, plata coloidal, nitrato de plata, poli(oxietilen (dimetilimino) etilen (dimetilimino) etilen bicloruro), dimetilditiocarbamato de sodio, 2-cloro-4,6-bis(etilamino)-5-triazina, cloruro de zinc, óxido de zinc y cloruro de bencilalconio

7 Un metodo de acuerdo con una cualquiera de las reivindicaciones 1 a



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4, en donde el producto químico para el tratamiento de agua se selecciona del grupo conformado por hipoclorito de metal alcalino, hipoclorito de metal alcalinoterreo, isocianuratos clorados, hidantoinas halogenadas, perboratos de metal alcalino, percarbonatos de metal alcalino, sales de cobre, sales de plata, compuestos de amonio cuaternario, compuestos de amonio policuaternario, sales de zinc, agentes quelantes, fungicidas, agentes de control de pH, inhibidores de corrosión y estabilizantes

8 Un método de acuerdo con una cualquiera de las reivindicaciones 1 a 4, en donde el producto químico para el tratamiento de agua es peróxido de hidrógeno

9 Un método de acuerdo con la reivindicación 3, en donde el producto químico para el tratamiento de agua es desinfectante agregado en una dosis de mantenimiento de alrededor de 0.1 ppm/día a alrededor de 6 ppm/día

10 Un método de acuerdo con la reivindicación 3, en donde el producto químico para el tratamiento de agua es desinfectante agregado en una dosis de mantenimiento de alrededor de 1 ppm/día a alrededor de 3 ppm/día

11 Un sistema para tratar un volumen de agua para mantener una cantidad predeterminada de un producto químico para el tratamiento de agua en el volumen de agua durante un periodo de tiempo, que comprende una bomba con un desplazamiento de tubo conectado cooperativamente a un computador para control de la bomba, una fuente de producto químico para suministro a la bomba, para aplicación por la bomba a un volumen de agua, haciendo que la bomba opere durante un tiempo suficiente para suministrar una cantidad de producto químico para el tratamiento de agua al volumen de agua, suficiente para mantener aproximadamente la cantidad predeterminada de producto químico para el tratamiento de agua en el volumen de agua durante el periodo de tiempo, en donde la bomba se hace operar durante un tiempo de operación (RT), calculado como el cociente de

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$$((K) (MD) / (PRPM \times PTD))$$

donde

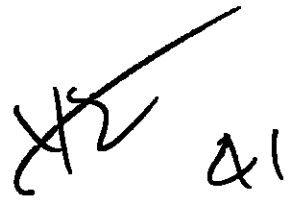
- RT = Tiempo de operacion de la bomba (segundos)
- PRPM = Velocidad de la bomba (RPM)
- PTD = Desplazamiento del tubo de la bomba
(ml)/revoluciones de la bomba
- K = 1776 ((seg -ml)/(min-oz)), y
- MD = (PV) (DC) donde
- MD = Dosis de mantenimiento de producto quimico
para el tratamiento de agua
- PV = Volumen de agua por tratar
- DC = Cantidad consumida de producto quimico
para el tratamiento de agua durante el periodo
de tiempo

12 Un sistema de acuerdo con la reivindicacion 11, en donde la fuente del producto quimico es una solucion acuosa del producto quimico para el tratamiento de agua

13 Un sistema de acuerdo con la reivindicacion 12, en donde la solucion tiene alrededor de 1% en peso (activo) a alrededor de 80% (activo) del producto quimico para el tratamiento de agua

14 Un sistema de acuerdo con una cualquiera de las reivindicaciones 11 a 13, en donde el la bomba se hace operar por un computador programado de acuerdo con la ecuación (2)

15 Un sistema de acuerdo con una cualquiera de las reivindicaciones 11 a 14, en donde el producto quimico para el tratamiento de agua se selecciona del grupo conformado por algicidas, desinfectantes, oxidantes, agentes quelantes, agentes de control de pH, inhibidores de corrosion y estabilizantes



hipoclorito de metal alcalinoterreo, isocianuratos clorados, hidantoinas halogenadas, perboratos de metal alcalino, percarbonatos de metal alcalino, sales de cobre, sales de plata, compuestos de amonio cuaternario, compuestos de amonio policuaternario, sales de zinc, agentes quelantes, fungicidas, agentes de control de pH, inhibidores de corrosión y estabilizantes

19 Un sistema de acuerdo con una cualquiera de las reivindicaciones 11 a 14, en donde el producto químico para el tratamiento de agua es peróxido de hidrógeno

20 Un sistema de acuerdo con la reivindicación 13, en donde el producto químico para el tratamiento de agua es desinfectante agregado en una dosis de mantenimiento de alrededor de 0.1 ppm/día a alrededor de 6 ppm/día

21 Un sistema de acuerdo con la reivindicación 13 en donde el producto químico para el tratamiento de agua es desinfectante agregado en una dosis de mantenimiento de alrededor de 1 ppm/día a alrededor de 3 ppm/día

22 Un sistema para tratar un volumen de agua para mantener una cantidad predeterminada de un producto químico para el tratamiento de agua en el volumen de agua durante un periodo de tiempo, que comprende un dispositivo para aplicar un producto químico para el tratamiento de agua a un volumen de agua, hacer que el dispositivo opere durante un tiempo suficiente para aplicar una dosis de mantenimiento de producto químico para el tratamiento de agua, suficiente para mantener aproximadamente la cantidad predeterminada de producto químico para el tratamiento de agua en el volumen de agua durante el periodo de tiempo, en donde la dosis de mantenimiento se calcula de acuerdo con la ecuación (1)

$$MD = (PV)(DC) \quad (1)$$

donde

$$MD = \text{Dosis de mantenimiento de producto químico para el}$$

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tratamiento de agua

PV = Volumen de agua por tratar

DC = Cantidad consumida de producto químico para el
tratamiento de agua durante el periodo de tiempo

23 Un metodo para tratar un volumen de agua para mantener una cantidad predeterminada de un producto químico para el tratamiento de agua en el volumen de agua durante un periodo de tiempo, que comprende aplicar un producto químico para el tratamiento de agua a un volumen de agua por un dispositivo controlado por un computador, operar el dispositivo durante un tiempo suficiente para aplicar una dosis de mantenimiento de producto químico para el tratamiento de agua, suficiente para mantener aproximadamente la cantidad predeterminada de producto químico para el tratamiento de agua en el volumen de agua durante el periodo de tiempo, en donde la dosis de mantenimiento se calcula de acuerdo con la ecuación (1)

$$MD = (PV)(DC) \quad (1)$$

donde

MD = Dosis de mantenimiento de producto químico para el
tratamiento de agua

PV = Volumen de agua por tratar

DC = Cantidad consumida de producto químico para el
tratamiento de agua durante el periodo de tiempo

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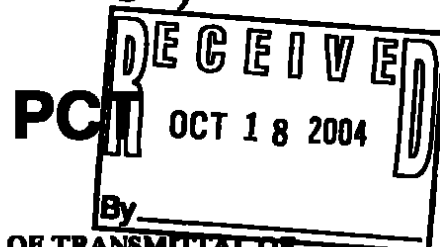
EXTRACTO

La invencion se relaciona con un metodo de tratamiento de cuerpos de agua, tales como piscinas recreativas, saunas y tinas calientes, con dosis de mantenimiento de productos químicos para el tratamiento de agua, para obtener una desinfeccion consistente y niveles esteticamente agradables de propiedades, tales como (eliminación de la) turbiedad La cantidad de la dosis de mantenimiento se basa en el volumen de agua por tratar, con el fin de obtener agua higienica y clara

El metodo puede automatizarse para un tratamiento seguro, consistente y exacto del agua, tal como se encuentra en piscinas de natacion, saunas o tinas calientes

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY



To:

BANNERMAN, David Gardner
WITHERS & ROGERS
GOLDINGS HOUSE
2 HAYS LANE
LONDON SE1 2HW
GRANDE BRETAGNE



NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71 I)

Date of mailing
(day/month/year)

28/09/2004

Applicant's or agent's file reference
P711404PCT/DE

IMPORTANT NOTIFICATION

International application No.

PCT/GB03/04649

International filing date (day/month/year)

29/10/2003

Priority date (day/month/year)

04/11/2002

Applicant

ARCH CHEMICALS, INC et al

- 1 The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any established on the international application.
- 2 A copy of the report and its annexes if any is being transmitted to the International Bureau for communication to all the elected Offices.
- 3 Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

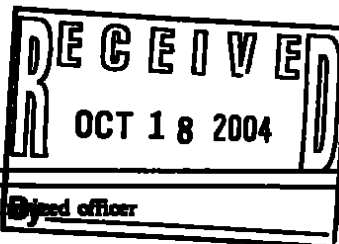
4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether in that State the claimed inventions are patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability requirements for enabling disclosure, clarity and support for the claims.



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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

(Rationalised Report according to the Notice of the President of the EPO published in the OJ11/2001)

Applicant's or agent's file reference P711404PCT/DE	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB03/04649	International filing date (day/month/year) 29/10/2003	Priority date (day/month/year) 04/11/2002
International Patent Classification (IPC) or national classification and IPC G02F1/00		
Applicant ARCH CHEMICALS, INC et al		

1 This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36

2 This REPORT consists of a total of 2 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70 16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consists of a total of _____ sheets.

3 This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 24/05/2004	Date of completion of this report 23/09/2004
Name and mailing address of the IPEA/  European Patent Office D-80298 Munich Tel (+49-89) 2399-0 Tx 523656 eprnu d Fax (+49-89) 2399-4465	Authorized officer HOFMANN D G Tel (+49-89) 2399 2828



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No **PCT/GB03/04649**

I Basis of the report

The basis of this international preliminary examination is the application as originally filed

V Reasoned statement under Rule 66.2(a)(II) with regard to novelty, inventive step or industrial applicability

In light of the documents cited in the international search report, it is considered that the invention as defined in at least some of the claims does not appear to meet the criteria mentioned in Article 33(1) PCT, i.e. does not appear to be novel and/or to involve an inventive step (see international search report, in particular the documents cited X and/or Y and corresponding claim references)

PATENT CO PERATION TREATY

6/7. UW
DGB 2/1

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

152

To:

BANNERMAN, David Gardner
WITHERS & ROGERS
GOLDINGS HOUSE
2 HAYS LANE
LONDON SE1 2HW
GRANDE BRETAGNE

RECEIVED
- 6 JUL 2004

WRITTEN OPINION

47

(PCT Rule 66)

Date of mailing
(day/month/year)

02/07/2004

Applicant's or agent's file reference

P711404PCT/DE

REPLY DUE

within 2 / 00 months/days
from the above date of mailing

International application No.

PCT/GB03/04649

International filing date (day/month/year)

29/10/2003

Priority date (day/month/year)

04/11/2002

International Patent Classification (IPC) or both national classification and IPC

G02F1/00

Applicant

ARCH CHEMICALS, INC et al

1 This written opinion is the first drawn up by this International Preliminary Examining Authority

2 This opinion contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66 2(a)(ii) with regard to novelty inventive step or industrial applicability citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

3 The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above The applicant may before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply accompanied, where appropriate by amendments, according to Rule 66.3 For the form and the language of the amendments see Rules 66.8 and 66.9

Also For an additional opportunity to submit amendments, see Rule 66.4 For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4bis For an informal communication with the examiner see Rule 66.6

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is. 04/03/2005

Name and mailing address of the IPEA/



European Patent Office
D-80298 Munich
Tel (+49-89) 2399-0 Tx. 523656
Fax. (+49-89) 2399-4465

RECEIVED
JUL 19 2004

Authorized officer

Formalities officer
(incl. extension of time limits)
Tel (+49-89) 2399 2828



Form PCT/IPEA/408 (cover sheet) (march 2002)

By _____

I Basis of the opinion

- 1 The basis of this written opinion is the application as originally filed

V Reasoned statement under Rule 66 2(a)(ii) with regard to novelty, inventive step or industrial applicability

- 1 In light of the documents cited in the international search report, it is considered that the invention as defined in at least some of the claims does not appear to meet the criteria mentioned in Article 33(1) PCT, i.e. does not appear to be novel and/or to involve an inventive step (see international search report, in particular the documents cited X and/or Y and corresponding claims references)
- 2 If amendments are filed, the applicant should comply with the requirements of Rule 66 8 PCT and indicate the basis of the amendments in the documents of the application as originally filed (Article 34 (2) (b) PCT) otherwise these amendments may not be taken into consideration for the establishment of the international preliminary examination report. The attention of the applicant is drawn to the fact that if the application contains an unnecessary plurality of independent claims no examination of any of the claims will be carried out
- NB Should the applicant decide to request detailed substantive examination, then an international preliminary examination report will normally be established directly. Exceptionally the examiner may draw up a second written opinion, should this be explicitly requested

INTERNATIONAL SEARCH REPORT

Inter
Application No
PCT/GB 03/04649

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C02F1/00 G01F11/02

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)

IPC 7 C02F G01F

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 practical, search terms used)

EPO-Internal, MPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 056 036 A (VAN BORK ERIK C) 8 October 1991 (1991-10-08) the whole document	1-23
X	US 3 756 456 A (GEORGI D) 4 September 1973 (1973-09-04) the whole document	1-23
A	EP 0 867 202 A (MUELLER ERICH) 30 September 1998 (1998-09-30) the whole document	1-23

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

Special categories of cited documents

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another claim or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

S document member of the same patent family

Date of the actual completion of the international search

10 February 2004

Date of mailing of the international search report

18/02/2004

Name and mailing address of the ISA

European Patent Office, P.O. Box 5010 Patentamt 2
NL - 2200 HV Rijswijk
Tel. (+31-70) 340-6040, Tx. 01 851 apo nl,
Fax: (+31-70) 340-3018

Authorized officer

Serra, R

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat

Application No

PCT/GB 03/04649

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5056036	A	08-10-1991	AT 154152 T 15-06-1997
		CA 2066581 A1 21-04-1991	
		DE 69030881 D1 10-07-1997	
		DE 69030881 T2 18-09-1997	
		EP 0496803 A1 05-08-1992	
		JP 5508700 T 02-12-1993	
		WO 9106062 A1 02-05-1991	
US 3756456	A	04-09-1973	CA 993083 A1 13-07-1976
		DE 2326902 A1 13-12-1973	
		FR 2185790 A1 04-01-1974	
		JP 49051980 A 20-05-1974	
		JP 57049849 B 25-10-1982	
		US RE29495 E 13-12-1977	
EP 0867202	A	30-09-1998	DE 29705611 U1 03-07-1997
		EP 0867202 A2 30-09-1998	

P.8.5618 Patentsan 2
2260 HV Rijswijk (ZH)
TE (070) 3 40 20 40
FAX (070) 3 40 30 18

Europäisches
Patentamt

European
Patent Office

Office européen
des brevets

Generaldirektion 1

Directorate General 1

Direction générale 1

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GRANDE BRETAGNE

REVELL
1.1.00
R-001
- 4 APR 2005



APR 12 2005

EPO Customer Services

Tel +31 (0)70 340 4500

Date

29 03 05

Reference SMC 60556	Application No./Patent No 03769671 3 - 2104 PCT/GB0304849
Applicant/Proprietor Arch Chemicals Inc	

Entry into the European phase before the European Patent Office

These notes describe the procedural steps required for entry into the European phase before the European Patent Office (EPO). You are advised to read them carefully. Failure to take the necessary action in time can lead to your application being deemed withdrawn.

- 1 The above-mentioned international patent application has been given European application No 03769671.3
- 2 Applicants without a residence or their principal place of business in an EPC contracting state may themselves initiate European processing of their international applications, provided they do so before expiry of the 31st month from the priority date (see also point 6 below)

During the European phase before the EPO as designated or elected Office, however, such applicants must be represented by a professional representative (Arts 133(2) and 134(1), (7) EPC)

Procedural acts performed after expiry of the 31st month by a professional representative who acted during the international phase but is not authorised to act before the EPO have no legal effect and therefore lead to loss of rights

Please note that a professional representative authorised to act before the EPO and who acted for the applicant during the international phase does not automatically become the representative for the European phase. Applicants are therefore strongly advised to appoint in good time any representative they wish to initiate the European phase for them, otherwise, the EPO has to send all communications direct to the applicant.

- 3 Applicants with a residence or their principal place of business in an EPC contracting state are not obliged to appoint, for the European phase before the EPO as designated or elected Office, a professional representative authorised to act before the EPO. However, in view of the complexity of the procedure it is recommended that they do so.
- 4 Applicants and professional representatives are also strongly advised to initiate the European phase using EPO Form 1200 (available free of charge from the EPO). This however is not compulsory.



5 To enter the European phase before the EPO the following acts must be performed
(N B Failure validly to do so will entail loss of rights or other adverse legal consequences)

5.1 If the EPO is acting as designated or elected Office (Arts 22(1)(3) and 39(1) PCT respectively) applicants must, within 31 months from the date of filing or (where applicable) the earliest priority date

a) Supply a translation of the international application into an EPO official language if the International Bureau did not publish the application in such a language (Art. 22(1) PCT and Rule 107(1)(a) EPC)

If the translation is not filed in time, the international application is deemed withdrawn before the EPO (Rule 108(1) EPC).

This loss of rights is deemed not to have occurred if the translation is then filed within a two-month grace period as from notification of an EPO communication, provided a surcharge is paid at the same time (Rule 108(3) EPC)

b) Pay the national basic fee (EUR 160,00) and, where a supplementary European search report has to be drawn up, the search fee (EUR 690,00 , Rule 107(1)(c) and (e) EPC)

c) If the time limit under Article 79(2) EPC expires before the 31-month time limit, pay the designation fee (EUR 75 00) for each contracting state designated (Rule 107(1)(d) EPC)

d) If the time limit under Article 94(2) EPC expires before the 31-month time limit, file the written request for examination and pay the examination fee (EUR 1430,00 , Rule 107(1)(f) EPC)

e) Pay the third-year renewal fee (EUR 380,00) if it falls due before expiry of the 31-month time limit (Rule 107(1)(g) EPC)

If the fees under (b) to (d) above are not paid in time, or the written request for examination is not filed in time the international application is deemed withdrawn before the EPO, or the contracting-state designation(s) in question is (are) deemed withdrawn (Rule 108(1) and (2) EPC). However the fees may still be validly paid within a two-month grace period as from notification of an EPO communication, provided the necessary surcharges are paid at the same time (Rule 108(3) EPC). For the renewal fee under (e) above, the grace period is six months from the fee's due date (Article 86(2) EPC)

5.2 If the application documents on which the European grant procedure is to be based comprise more than ten claims, a claims fee is payable within the 31-month time limit under Rule 107(1) EPC for the eleventh and each subsequent claim (Rule 110(1) EPC). The fee can however still be paid within a one-month grace period as from notification of an EPO communication pointing out the failure to pay (Rule 110(2) EPC)

6. If the applicant had a representative during the application's international phase the present notes will be sent to the representative, asking him to inform the applicant accordingly

All subsequent communications will be sent to the applicant, or - if the EPO is informed of his appointment in time - to the applicant's European representative



Date

Sheet 3

Application No. 03769671.3

34

53

- 7 For more details about time limits and procedural acts before the EPO as designated and elected Office, see the EPO brochure

How to get a European patent
Guide for applicants - Part 2
PCT procedure before the EPO - "Euro-PCT"

This brochure the list of professional representatives before the EPO, Form 1200 and details of the latest fees are now all available on the Internet under

<http://www.european-patent-office.org>

RECEIVING SECTION



WITHERS & ROGERS

EUROPEAN & CHARTERED PATENT ATTORNEYS
TRADE MARK ATTORNEYS

Goldings House, 2 Hays Lane, London SE1 2HW
Tel +44 (0)20 7663 3500 Fax +44 (0)20 7663 3550
E-Mail admin@witherrogers.com Web www.witherrogers.com

European Patent Office
D-80298
München
Germany

Our Ref P711404PCT/DE/caw
Your Ref

20 May 2004

To Contact the Writer
Telephone +44 1926 336111

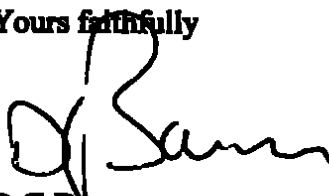
Dear Sirs

International Patent Application No. PCT/GB03/004649
Method of Water Treatment
Arch Chemicals, Inc.

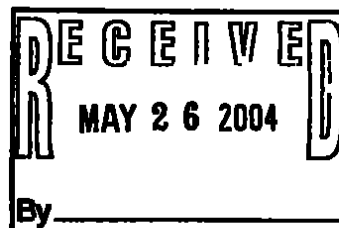
Please find enclosed a Demand which is filed in respect of the above application

The above application has been transferred to Arch Chemicals, Inc. An Assignment and Powers of Attorney in favour of Withers & Rogers have been filed separately at WIPO. A copy of the letter sent to WIPO is attached for your records

Yours faithfully


D G Bannerman
WITHERS & ROGERS

Enclosures



Ref. 25 (2004)

Partners: David Bannerman, Michael Blanchford, Adrian Chettle, Jeff Hogg, John Dean, Ben Dempster, Karl Barnfather, Simon Beck, Ivor Harrison, David Pratt, Mark Arncliffe*, Colin Jones, Howard Wright, David Croston, John Jones, Fiona McBride*, Ben Nussle*, David Elby, Adrian Tombling, Laurel McBray*
* MITMA All other partners C.P.A. & E.P.A.

Associates: Jackie Tolson, James Gray, Cathryn Wardle, Matthew Gillard, Nicholas Jones, Paul Foot, Matthew Allen, Keith Tart, Helen Cawley, Alan St George, Rachel Wallis, Kim Pringle, Kathryn Crane, Christopher Ellis, Russell Barton
Consultants: Michael Adams, David Cowan

Practice Manager: Nick Dougan, Renewals: David Ayres (Manager), Mary Downey
Accounts: Mary Sturgeon, Translations: Rosemary Booth, EP Formalities: Karen Austin

Also at 60 Holly Walk, Leamington Spa, Warwickshire CV32 4JE Tel. +44 (0)1926 336111 Fax +44 (0)1926 335519
1 Redcliff Street, Bristol BS1 6NP Tel. +44 (0)117 925 3030 Fax +44 (0)117 925 3530 and
75 Colmore Row Birmingham B3 2AP Tel. +44 (0)121 245 3900 Fax +44 (0)121 245 3930

The demand must be filed directly with the competent International Preliminary Examining Authority or if two or more authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below

IPEA/

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty

The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty

For International Preliminary Examining Authority use only

Identification of IPEA		Date of receipt of DEMAND	
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference P711404PCT/DE	
International application No. PCT/GB03/004649	International filing date (day/month/year) 29 October 2003	(Earliest) Priority date (day/month/year) 4 November 2002	
Title of invention Method of Water Treatment			
Box No. II APPLICANT(S)			
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) Arch Chemicals, Inc. 501 Merritt 7 Box 5204 Norwalk Connecticut 06856-5204 USA		Telephone No.	
		Facsimile No.	
		Teleprinter No.	
		Applicant's registration No. with the Office	
State (that is, country) of nationality US		State (that is, country) of residence: US	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) UNHOCH, Michael Joseph 235 Cherry Lane Newcastle DE 19720 USA			
State (that is, country) of nationality US		State (that is, country) of residence: US	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)			
State (that is, country) of nationality		State (that is, country) of residence:	
☐ Further applicants are indicated on a continuation sheet.			

Box No. III AGENT OR COMMON REPRESENTATIVE, OR ADDRESS FOR CORRESPONDENCE

The following person is ☒ agent ☐ common representative

and ☐ has been appointed earlier and represents the applicant(s) also for international preliminary examination.

☒ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.

☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier

Name and address (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country.)

BANNERMAN, David, Gardner
WITHERS & ROGERS
GOLDINGS HOUSE
2 HAYS LANE
LONDON, SE1 2HW
UNITED KINGDOM

Telephone No.

+44 (0) 1926 336111

Facsimile No.

+44 (0) 1926 335519

Teleprinter No.

Agent's registration No. with the Office

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION

Statement concerning amendments.*

1 The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filed

the description ☐ as originally filed

☐ as amended under Article 34

the claims ☐ as originally filed

☐ as amended under Article 19 (together with any accompanying statement)

☐ as amended under Article 34

the drawings ☐ as originally filed

☐ as amended under Article 34

2 ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.

3 ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of the applicable time limit under Rule 69 1(d).

4 ☐ The applicant expressly wishes the international preliminary examination to start earlier than at the expiration of the applicable time limit under Rule 54bis 1(a).

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination English

☒ which is the language in which the international application was filed.

☐ which is the language of a translation furnished for the purposes of international search.

☐ which is the language of publication of the international application.

☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

Box No. V ELECTION OF STATES

The filing of this demand constitutes the election of all Contracting States which are designated and are bound by Chapter II of the PCT

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV for the purposes of international preliminary examination:

- | | |
|--|--------|
| 1 translation of international application | sheets |
| 2 amendments under Article 34 | sheets |
| 3 copy (or where required, translation) of amendments under Article 19 | sheets |
| 4 copy (or, where required, translation) of statement under Article 19 | sheets |
| 5 letter | sheets |
| 6 other (specify) | sheets |

For International Preliminary Examining Authority use only

received not received

- | | |
|--------------------------|--------------------------|
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |
| ☐ | ☐ |

The demand is also accompanied by the item(s) marked below

- | | |
|--|---|
| 1 ☒ fee calculation sheet | 5 ☐ statement explaining lack of signature |
| 2 ☐ original separate power of attorney | 6 ☐ sequence listing in computer readable form |
| 3 ☐ original general power of attorney | 7 ☐ tables in computer readable form related to a sequence listing |
| 4 ☐ copy of general power of attorney, reference number, if any | 8 ☐ other (specify) |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).



20 May 2004

David Gardner BANNERMAN
European Patent Attorney

For International Preliminary Examining Authority use only

1 Date of actual receipt of DEMAND

2 Adjusted date of receipt of demand due to CORRECTIONS under Rule 60 1(b):

- 3 ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below does not apply
- ☐ The applicant has been informed accordingly
- 4 ☐ The date of receipt of the demand is WITHIN the time limit of 19 months from the priority date as extended by virtue of Rule 80.5
- 5 ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

- 6 ☐ The date of receipt of the demand is AFTER the expiration of the time limit under Rule 54bis.1(a) and item 7 or 8, below does not apply
- 7 ☐ The date of receipt of the demand is WITHIN the time limit under Rule 54bis.1(a) as extended by virtue of Rule 80.5.
- 8 ☐ Although the date of receipt of the demand is after the expiration of the time limit under Rule 54bis.1(a), the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on.

WITHERS ♦ ROGERS

EUROPEAN & CHARTERED PATENT ATTORNEYS
TRADE MARK ATTORNEYS

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International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20
Switzerland

Our Ref P711404PCT/DE/caw
Your Ref

19 May 2004

COPY

BY FACSIMILE
(CONFIRMATION BY POST)
To Contact the Writer
Telephone +44 1926 336111

Dear Sirs

International Patent Application Application No. PCT/GB03/004649
Method of Water Treatment
Arch Chemicals, Inc.

The above International Patent Application has been assigned from Avecia Inc. and Avecia Ltd. to Arch Chemicals, Inc., 501 Merritt 7, Box 5204, Norwalk, Connecticut 06856-5204, USA.

Please change the Applicant for all designated states, apart from the United States, to Arch Chemicals, Inc. The Applicant for the purposes of the United States only is still Unhoch, Michael Joseph.

We enclose a Power of Attorney signed by Arch Chemicals, Inc. and by the Inventor/Applicant for the United States, Michael Joseph Unhoch.

The attached copy of the Assignment specifically refers to the above International Patent Application as Case 8 in the schedule of patents transferred.

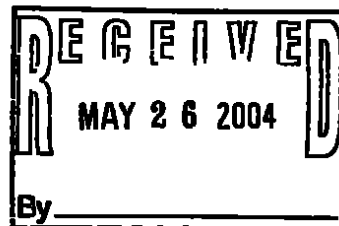
If you have any queries, please do not hesitate to contact the undersigned or David Elsy at our Leamington Spa office (+44 1926 336111)

Yours faithfully

D G BANNERMAN

D G Bannerman
WITHERS & ROGERS

Enclosures



Ref. 23 (2004)

Partners: David Bannerman, Michael Blatchford, Adrian Chetler, Jeff Hagg, John Dean, Ben Dempster, Karl Bannister, Simon Beck, Ivor Harrison, David Pratt, Mark Arncliffe*, Colin Jones, Howard Wright, David Croston, John Jones, Fiona McBride*

Bona Nusselher*, David Elsy, Adrian Tombling, Laurel McBry*

* MITMA. All other partners C.P.A. & E.P.A.

Associates: Jackie Tolson, James Grey, Callum Wardle, Matthew Gillard, Nicholas Jones, Paul Foot, Matthew Allen, Keith Tart, Helen Cawley, Alan St George, Rachel Wallis, Ken Piragie, Kathryn Cruise, Christopher Ellis, Russell Barton

Consultants: Michael Adams, David Cowan

Practice Manager: Nick Douglas, Renewals: David Ayres (Manager), Mary Downey

Accounts: Mary Sturgess, Translations: Rosemary Booth, EP Formalities: Karen Austin

Also at 60 Holly Walk, Leamington Spa, Warwickshire CV32 4JE Tel: +44 (0)1926 336111 Fax: +44 (0)1926 335519

1 Redcliff Street, Bristol BS1 6NP Tel: +44 (0)117 925 3030 Fax: +44 (0)117 925 3530 and

75 Colmore Row, Birmingham B3 2AP Tel: +44 (0)121 245 3900 Fax: +44 (0)121 245 3930

WITHERS ♦ ROGERS
POWER OF ATTORNEY

PATENT CO-OPERATION TREATY

The undersigned **HEREBY APPOINTS -**

D G Bannerman
W M. Blatchford
M. Adkins
A J Chettle
J K. Hogg
J P Dean
I S Harrison
D M Pratt

B J N Dempster
K J Darnfather
S A Reck
H H B Wright
D Croston
D C. Jones
J B Jones
D Elsy

A G Tombling
D R. Cowan
J Gray
M. P Gillard
C T Wardle
P M J Foot
N A Jones

of.

WITHERS & ROGERS
Goldings House
2 Hays Lane
London SE1 2HW
UNITED KINGDOM

as agents,

to act on their behalf before the competent International Authorities in connection with the International Application No PCT/GB03/004649 concerning METHOD OF WATER TREATMENT and to receive payments on their behalf The above agents are also authorised to appoint sub-agents.

1 Place Norwalk, Connecticut, U S A

Date 11 MAY , 2004

2 Signed 
(on behalf of the Applicant)

W Paul Bush
Full Name of Signatory

Vice President and Treasurer
Status of Signatory

3 Signed ---
(Inventor/Applicant for US)

Michael Joseph Unhoch
Full Name of Signatory

WITHERS ♦ ROGERS
POWER OF ATTORNEY

60

PATENT CO-OPERATION TREATY

The undersigned **HEREBY APPOINTS -**

D G Bannerman
W M. Blatchford
M. Adkins
A J Chottlo
J K. Hogg
J P Dean
I S Harrison
D M Pratt

B J N Dempster
K J Barnfather
S A Beck
H H B. Wright
D Croston
D C. Jones
J B Jones
D Elsy

A. G Tombling
D R. Cowan
J Gray
M. P. Gillard
C. T Wardle
P M J Foot
N A. Jones

of

WITHERS & ROGERS
Goldings House
2 Hays Lane
London SE1 2HW
UNITED KINGDOM

as agents,

to act on their behalf before the competent International Authorities in connection with the International Application No PCT/GB03/004649 concerning METHOD OF WATER TREATMENT and to receive payments on their behalf The above agents are also authorized to appoint sub-agents.

1 Place Norwalk, Connecticut, U S A

Date - . . . , 2004

2 Signed . . .
(on behalf of the Applicant)

W . Paul Bush
Full Name of Signatory

Vice President and Treasurer
Status of Signatory

3 Signed *Michael J. Unhoch*
(Inventor/Applicant for US)

Michael Joseph Unhoch
Full Name of Signatory

EUROPEAN PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL SEARCHING AUTHORITY

To:
AVECIA LIMITED
Attn Revell, Christopher
Intellectual Property Group
P O Box 42, Hexagon House
Blackley, Manchester M9 8ZS
UNITED KINGDOM

AVECIA LIMITED
RECEIVED
24 FEB 2004

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing
(day/month/year) 18/02/2004

Applicant's or agent's file reference

BMC 60556/WO

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.

PCT/GB 03/04649

International filing date
(day/month/year)

29/10/2003

Applicant

AVECIA INC

1 ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith

Filing of amendments and statement under Article 18:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 48)

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34 chemin des Colombettes
1211 Geneva 20 Switzerland
Facsimile No. (41-22) 740 14.35

ENTERED INTO XENHP

EMINDER CREATED FOR
JEY

DATE

24/2/04

INITIALS

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For more detailed instructions, see the notes on the accompanying sheet

BE VERIFIED

HP ENTRY VERIFIED

2 ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4 Further action(s): The applicant is reminded of the following:

Shortly after 18 months from the priority date the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication a notice of withdrawal of the international application or of the priority claim must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively before the completion of the technical preparations for international publication

Within 18 months from the priority date a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II

Name and mailing address of the International Searching Authority



European Patent Office P.B. 5618 Patenteaan 2
NL-2280 HV Rijswijk
Tel (+31-70) 340-2040, Tx 31 651 epo nl
Fax (+31-70) 340-3016

Authorized officer

José-Antonio Almalé Murill

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These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the letter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 18 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 206(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 206(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English, if the language of the international application is French, the letter must be in French.

[Handwritten signature] 63

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new
- (iv) the claim replaces one or more claims as filed,
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51].
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers, claims 30, 33 and 36 unchanged, new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11].
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled, new claims 15, 16 and 17 added. or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1, 10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14, claim 17 subdivided into amended claims 15, 16 and 17- new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 48.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/selected Office, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/selected Office, see Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY

PCT

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference SNC 60556/WO	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable item 5 below	
International application No PCT/GB 03/04649	International filing date (day/month/year) 29/10/2003	(Earliest) Priority Date (day/month/year) 04/11/2002
Applicant AVECIA INC		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed unless otherwise indicated under this item

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application the international search was carried out on the basis of the sequence listing

☐ contained in the international application in written form

☐ filed together with the international application in computer readable form

☐ furnished subsequently to this Authority in written form

☐ furnished subsequently to this Authority in computer readable form

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows.

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

Int. Application No.

PCT/GB 03/04646

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C02F1/00 G01F11/02

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)

IPC 7 C02F G01F

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 practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 056 036 A (VAN BORK ERIK C) 8 October 1991 (1991-10-08) the whole document	1-23
X	US 3 756 456 A (GEORGI D) 4 September 1973 (1973-09-04) the whole document	1-23
A	EP 0 867 202 A (MUELLER ERICH) 30 September 1998 (1998-09-30) the whole document	1-23

☐ Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

Special categories of cited documents

- A document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document relating to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- & document member of the same patent family

Date of the actual completion of the international search

10 February 2004

Date of mailing of the international search report

18/02/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Palatzen 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Serra, R

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/GB 03/04649

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5056036	A	08-10-1991	AT 154152 T	15-06-1997
			CA 2066581 A1	21-04-1991
			DE 69030881 D1	10-07-1997
			DE 69030881 T2	18-09-1997
			EP 0496803 A1	05-08-1992
			JP 5508700 T	02-12-1993
			WO 9106062 A1	02-05-1991
US 3756456	A	04-09-1973	CA 993083 A1	13-07-1976
			DE 2325902 A1	13-12-1973
			FR 2185790 A1	04-01-1974
			JP 49051980 A	20-05-1974
			JP 57049849 B	25-10-1982
			US RE29495 E	13-12-1977
EP 0867202	A	30-09-1998	DE 29705611 U1	03-07-1997
			EP 0867202 A2	30-09-1998

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL SEARCHING AUTHORITY

To

AVECIA LIMITED
Attn Revell, Christopher
Intellectual Property Group
P O Box 42, Hexagon House
Blackley, Manchester M9 8XS
UNITED KINGDOM

NOTIFICATION OF RECEIPT
OF SEARCH COPY

P (3RO)

(PCT/PA 25.1)

30 JAN 2004

Date of mailing
(day/month/year)

27/01/2004

Applicant's or agent's file reference

PCT/GB 03/04649

IMPORTANT NOTIFICATION

International application No.

PCT/GB 03/04649

International filing date (day/month/year)

29/10/2003

Priority date (day/month/year)

04/11/2002

Applicant

AVECIA INC

1 Where the International Searching Authority and the Receiving Office are not the same office

The applicant is hereby notified that the search copy of the international application was received by this International Searching Authority on the date indicated below

Where the International Searching Authority and the Receiving Office are the same office

The applicant is hereby notified that the search copy of the international application was received on the date indicated below

19/11/2003

(date of receipt)

2 ☐ The search copy was accompanied by a nucleotide and/or amino acid sequence listing in computer readable form.

ENTERED INTO XEN-IP

DATE

INITIALS

30/1/04

ES

3 Time limit for establishment of International Search Report

REMINDER CREATED FOR

The applicant is informed that the time limit for establishing the International Search Report is 9 months from the date of receipt indicated above or 9 months from the priority date, whichever time is later.

4 A copy of this notification has been sent to the International Bureau and, where the first sentence of paragraph 1 applies, to the Receiving Office

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel (+31 70) 340-2040, Tx 31 651 epo nl,
Fax (+31 70) 340-3016

Authorized officer

ISA/EP

PATENT COOPERATION TREATY

69
PCT
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From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

AVECIA LIMITED
Attn Revell, Christopher
Intellectual Property Group
P O Box 42, Hexagon House
Blackley, Manchester M9 8ZS
UNITED KINGDOM

AVECIA LIMITED
IP GROUP
PCT
30 JAN 2004

COMMUNICATION IN CASES FOR WHICH
NO OTHER FORM IS APPLICABLE

Date of mailing
(day/month/year)

27/01/2004

Applicant's or agent's file reference

IPC 60556/MQ

REPLY DUE

See paragraph 1 below

International application No

PCT/GB 03/04649

International filing date
(day/month/year)

29/10/2003

Applicant

AVECIA INC

1 ☐ REPLY DUE within _____ months/days from the above date of mailing

☒ NO REPLY DUE

2. COMMUNICATION

The applicant is informed that establishment of the international search report (ISR) for non first-filings may be delayed due to a current search backlog

Although the time limit for entering the national phase before designated offices under Article 22(1) PCT and elected offices under Article 38(1) PCT has, with effect from 1 April 2002 (see PCT Gazette 44/2001 Section IV) been set at 30 months from the priority date (before the EPO the time limit is 31 months from the priority date see Rule 107 EPC as amended with effect from 2 January 2002 OJ EPO 8-8/2001, 373) not all PCT contracting states have yet made the necessary changes to their national laws and will for the time being continue to require entry to the national phase at 30/31 months from the priority date if a demand has not been filed before the end of 19 months from the priority date see PCT Gazette/PCT Newsletter available on the WIPO internet site at <http://www.wipo.int/pct/en/index.html> for an up to date list of the applicable time limits.

In these circumstances, the EPO acting as IPEA will accept, without any late payment fee under Rule 58bis PCT, the handling fee and the preliminary examination fee due in respect of the demand relating to the present application, even if they are not paid within the time limit prescribed in Rules 57.3 and 58.1(b) PCT, provided that they are paid within one month from the date of transmittal of the ISR, i.e., the EPO will only send an invitation pursuant to Rule 58bis.1(a) PCT after expiry of this one-month period. In all cases where the EPO has sent an invitation to pay and the applicant has not paid in full the amount due the demand shall be considered as if it had not been submitted (Rule 58bis.1(b)-(d) PCT). A loss of rights may well be the consequence in designated states where the time limit for entry into the national phase under Article 22 PCT has already expired (see also Article 37(4) PCT).

Note that if the competent IPEA chosen by the applicant is not the EPO and if the fees mentioned above are not paid within the time limit prescribed in Rules 57.3 and 58.1(b) PCT, the competent IPEA is entitled to apply Rule 58bis.1(a) PCT immediately thereafter

If your application is affected, we apologise for any inconvenience caused.

Finally, applicants are reminded that as of 3 January 2002 a rationalised PCT II procedure may apply, see OJ EPO 11/2001, 539 and that the EPO as ISA will not carry out international search on an application which relates to no more than a method of doing business, see OJ EPO 10/2001, 482. Applicants should also bear in mind the restriction of the EPO's competence as ISA and IPEA in certain technical fields in respect of certain international applications, see OJ EPO 1/2002, 52 and PCT Newsletter 1/2002 for further details.

Name and mailing address of the International Searching Authority



European Patent Office, P B 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

ISA/EP

PATENT COOPERATION TREATY

PCT/GB2003/004649

RSINXTFA

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PCT

From the INTERNATIONAL BUREAU

NOTIFICATION CONCERNING SUBMISSION OR TRANSMITTAL OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To

REVELL, Christopher
Avecia Limited
Intellectual Property Group
P O Box 42, Hexagon House
Blackley
Manchester M9 8ZS
United Kingdom

RECEIVED
03 FEB 2004

Date of mailing (day/month/year) 26 January 2004 (26 01 2004)	
Applicant's or agent's file reference SMC 60558/WO	IMPORTANT NOTIFICATION
International application No. PCT/GB2003/004649	International filing date (day/month/year) 29 October 2003 (29 10 2003)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 04 November 2002 (04 11 2002)
Applicant AVECIA INC et al	

- By means of this Form which replaces any previously issued notification concerning submission or transmittal of priority documents, the applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR" in the right hand column or by an asterisk appearing next to a date of receipt, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17 1(a) or (b)
- (If applicable) The letters "NR" appearing in the right-hand column denote a priority document which, on the date of mailing of this Form, had not yet been received by the International Bureau under Rule 17 1(a) or (b). Where under Rule 17 1(a) the priority document must be submitted by the applicant to the receiving Office or the International Bureau but the applicant fails to submit the priority document within the applicable time limit under that Rule, the attention of the applicant is directed to Rule 17 1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
- (If applicable) An asterisk (*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17 1(a) or (b) (the priority document was received after the time limit prescribed in Rule 17 1(a) or the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17 1(b)). Even though the priority document was not furnished in compliance with Rule 17 1(a) or (b) the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as priority document, Rule 17 1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

Priority date	Priority application No.	Country or regional Office or PCT receiving Office	Date of receipt of priority document
04 Nove 2002 (04 11 2002)	60/423,790	US	20 Janu 2004 (20 01 2004)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Sylvia OSODO
Facsimile No. (41-22) 338.87.40	Telephone No. (41-22) 338 7087

Form PCT/IB/304 (January 2004)

006072774

PATENT COOPERATION TREATY

PCT/GB03/04849

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF RECEIPT OF RECORD COPY

(PCT Rule 24.2(a))

To

REVELL, Christopher
Avecia Limited
Intellectual Property Group
P O Box 42, Hexagon House
Blackley
Manchester M9 8ZS
United Kingdom

AVECIA LIMITED
IP GROUP
RECEIVED
19 DEC 2003

Date of mailing (day/month/year) 12 December 2003 (12 12 03)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference SMC 60556/WO	International application No. PCT/GB03/04649

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below

Name(s) of the applicant(s) and State(s) for which they are applicants

AVECIA INC (for all designated States except MN,US)
AVECIA LIMITED (for MN)
UNHOCH, Michael, Joseph (for US)

International filing date

29 October 2003 (29 10 03)

Priority date(s) claimed

04 November 2002 (04 11 02)

Date of receipt of the record copy
by the International Bureau

21 November 2003 (21 11 03)

List of designated Offices

AP GH,GM,KE,LS,MW,MZ,SD,SL,SZ,TZ,UG,ZM,ZW
EA AM,AZ,BY,KG,KZ,MD,RU,TJ,TM
EP AT,BE,BG,CH,CY,CZ,DE,DK,EE,ES,FI,FR,GB,GR,HU,IE,IT,LU,MC,NL,PT,RO,SE,SI,SK,TR
OA BF,BJ,CF,CG,CI,CM,GA,GN,GO,GW,ML,MR,NE,SN,TD,TG
National AE,AG,AL,AM,AT,AU,AZ,BA,BB,BG,BR,BY,BZ,CA,CH,CN,CO,CR,CU,CZ,DE,DK,DM,DZ,
EC,EE,EG,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KP,KR,KZ,LC,LK,LR,LS,LT,
LU,LV,MA,MD,MG,MK,MN,MW,MX,MZ,NI,NO,NZ,OM,PG,PH,PL,PT,RO,RU,SC,SD,SE,SG,SK,SL,SY,
TJ,TM,TN,TR,TZ,UA,UG,US,UZ,VC,VN,YU,ZA,ZM,ZW

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 338.87.40

Authorized officer

Tewfik BENYAHIA

Telephone No. (41-22) 338 8459

Continuation of Form PCT/IB/301

NOTIFICATION OF RECEIPT OF RECORD COPY

Date of mailing (day/month/year) 12 December 2003 (12 12 03)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference SMC 60556/WO	International application No. PCT/GB03/04649

ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to

- ☒ time limits for entry into the national phase see updated important information (as of April 2002)
- ☐ confirmation of precautionary designations (if applicable)
- ☒ requirements regarding priority documents (if applicable)

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority

INFORMATION ON TIME LIMITS FOR ENTERING THE NATIONAL PHASE

The applicant is reminded that the "national phase" must be entered before each of the designated Offices indicated on the cover sheet of this Notification by paying national fees and furnishing translations, as prescribed by Articles 22 and 39 and the applicable national laws. In addition, the applicant may also have to comply with other special requirements applicable in certain Offices. It is the applicant's responsibility to ensure the necessary steps to enter the national phase are taken in a timely fashion. Most Offices do not issue reminders to applicants in connection with the entry into the national phase.

The applicable time limit for entering the national phase will, subject to what is said in the following paragraph, be 30 MONTHS from the priority date, not only in respect of any elected Office where a demand for international preliminary examination is filed before the expiration of 18 months from the priority date (see Article 38(1)) but also in respect of any designated Office in the absence of filing of such demand, where Article 22(1) as modified with effect from 1 April 2002 applies in respect of that designated Office. For further details, see PCT Gazette No. 44/2001 of 1 November 2001 pages 19928, 19932 and 19934, as well as the PCT Newsletter October and November 2001 and February 2002 issues.

In practice, time limits other than the 30-month time limit will continue to apply for various periods of time, in respect of certain designated or elected Offices. For regular updates on the applicable time limits (20, 21 30 or 31 months, or other time limit), Office by Office, refer to the PCT Gazette ("Section IV" part published on a weekly basis), to the PCT Newsletter (on a monthly basis) and to the relevant National Chapters in Volume II of the PCT Applicant's Guide (the paper version of which is updated usually twice a year and the Internet version of which is updated usually on a weekly basis). Finally a cumulative table of all applicable time limits for entering the national phase is available from WIPO's Internet site, via links from various pages the site including those of the Gazette, Newsletter and Guide, at <http://www.wipo.int/pct/en/index.html>.

Information about the requirements for filing a demand for international preliminary examination is set out in the PCT Applicant's Guide, Volume I/A, Chapter IX. Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination (at present, all PCT Contracting States are bound by Chapter II).

CONFIRMATION OF PRECAUTIONARY DESIGNATIONS

This notification lists only specific designations made under Rule 4.8(a) in the request. It is important to check that these designations are correct. Errors in designations can be corrected where precautionary designations have been made under Rule 4.8(b). The applicant is hereby reminded that any precautionary designations may be confirmed according to Rule 4.8(c) before the expiration of 16 months from the priority date (this time limit may not be extended). If it is not confirmed it will automatically be regarded as withdrawn by the applicant. There will be no reminder and no invitation. Confirmation of a designation consists of the filing of a notice specifying the designated State concerned (with indication of the kind of protection or treatment desired) and the payment of the designation and confirmation fees. The Notice of confirmation and payment must reach the receiving Office within the 16-month time limit.

REQUIREMENTS REGARDING PRIORITY DOCUMENTS

For applicants who have not yet complied with the requirements regarding priority documents, the following is recalled.

Where the priority of an earlier national, regional or international application is claimed, the applicant must submit a copy of the said earlier application, certified by the authority with which it was filed ("the priority document") to the receiving Office (which will transmit it to the International Bureau) or directly to the International Bureau before the expiration of 16 months from the priority date, provided that any such priority document may still be submitted to the International Bureau before that date of international publication of the international application, in which case that document will be considered to have been received by the International Bureau on the last day of the 16-month time limit (Rule 17.1(a)).

Where the priority document is issued by the receiving Office, the applicant may instead of submitting the priority document, request the receiving Office to prepare and transmit the priority document to the International Bureau. Such request must be made before the expiration of the 16-month time limit and may be subjected by the receiving Office to the payment of a fee (Rule 17.1(b)).

If the priority document concerned is not submitted to the International Bureau or if the request to the receiving Office to prepare and transmit the priority document has not been made (and the corresponding fee, if any paid) within the applicable time limit indicated under the preceding paragraphs, any designated State may disregard the priority claim provided that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity upon entry into the national phase to furnish the priority document within the time limit which is reasonable under the circumstances.

Where several priorities are claimed, the priority date to be considered for the purposes of computing the 16-month time limit is the filing date of the earliest application whose priority is claimed.

The International Section
The Patent Office
Cardiff Road
Newport
Gwent
NP9 1RH

BY REGISTERED POST

Our ref	Direct Tel No	Direct Fax No	Date
KMP/GS	0161 721 1361/2	0161 721 5801	9 December 2003
SMC 60556/WO			

Dear Sirs,

**FOLLOW-UP DOCUMENTS FOR NEW PATENT APPLICATION -
AVECIA CASE SMC 60556/WO**

Further to Form PCT/RO/106 dated 7 November 2003 please find attached follow-up documents for the new patent application filed via the PCT

<u>Applicants</u>	Avecia Inc
<u>Inventors</u>	UNHOCH, Michael Joseph
<u>Title</u>	Method of Water Treatment

Filing Details

Application No	Filing Date
PCT/GB2003/004649	29/10/2003

Yours faithfully
for Avecia Limited

K M Pinder (Mrs)/G Shepherd (Mrs)
Procedural Law Unit
Intellectual Property Group

Enclosures

US Certified Priority Document

PATENT COOPERATION TREATY

From the RECEIVING OFFICE

To
AVECIA Limited
PO Box 42
Hexagon House
Blackley
MANCHESTER
M9 8ZS

AVECIA
IF 2201
RECEIVED
16 NOV 2003

PCT

NOTIFICATION OF THE INTERNATIONAL
APPLICATION NUMBER AND OF THE
INTERNATIONAL FILING DATE

(PCT Rule 20 5(e))

Date of mailing
(day/month/year)

07 NOV 2003

Applicant's or agents's file reference
SMC 60556/WO

IMPORTANT NOTIFICATION

International application No.
PCT/GB2003/004649International filing date (day/month/year)
29/10/2003Priority date (day/month/year)
04/11/2002Applicant
Avecia Inc et alTitle of the invention
Method of Water Treatment

1 The applicant is hereby notified that the international application has been accorded the international application number and the international filing date indicated above.

2 The applicant is further notified that the record copy of the international application



was transmitted to the International Bureau on

07 NOV 2003



has not yet been transmitted to the International Bureau for the reason indicated below and a copy of this notification has been sent to the International Bureau*



because the necessary national security clearance has not yet been obtained



because (reason to be specified).

	DATE	INITIALS
ENTERED INTO XEN-IP	11/11/03	GS
REMINDER CREATED FOR EY	11/11/03	ANL
TO BE VERIFIED ***	12/11/03	ANL
ENTRY VERIFIED		

- * The International Bureau monitors the transmittal of the record copy by the receiving Office and will notify the applicant (with Form PCT/IB/301) of its receipt. Should the record copy not have been received by the expiration of 14 months from the priority date the International Bureau will notify the applicant (Rule 22 1(e))

Name and mailing address of the receiving Office

The Patent Office
Cardiff Road, Newport
South Wales NP10 8QQ

Facsimile No

Authorized officer

Paul Storer

Telephone No. 01633 814427

PATENT COOPERATION TREATY

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From the RECEIVING OFFICE

PCT

To
AVECIA Limited
PO Box 42
Hexagon House
Blackley
MANCHESTER
M9 8ZS

INVITATION TO CORRECT DEFECTS IN
THE INTERNATIONAL APPLICATION

(PCT Articles 3(4)(i) and 14(1) and Rule 26)

Date of mailing
(day/month/year)

07 NOV 2003

Applicant's or agents's file reference
SMC 60556/WO

REPLY DUE within Two months/days
from the above date of mailing

International application No.
PCT/GB2003/004649

International filing date
(day/month/year) 29/10/2003

Applicant
Avecia Inc et al

- 1 ☒ The applicant is hereby invited, within the time limit indicated above, to correct, in the international application as filed the defects specified on the attached

☒ Annex A

☐ Annex B1 (text matter of the international application as filed)

☐ Annex C1 (drawings of the international application as filed)

- 2 ☐ The applicant is hereby invited within the time limit indicated above to correct, in the translation of the international application furnished under Rule 12.3 or 12.4, the defects specified on the attached

☐ Annex A

☐ Annex B2 (text matter of the translation of the international application)

☐ Annex C2 (drawings of the translation of the international application)

Additional observations (if necessary)

HOW TO CORRECT THE DEFECTS?

Correction must be submitted by filing a replacement sheet embodying the correction and a letter accompanying the replacement sheet, which shall draw attention to the difference between the replaced sheet and the replacement sheet. A correction may be stated in a letter only if it is of such a nature that it can be transferred from the letter to the record copy without adversely affecting the clarity and direct reproducibility of the sheet onto which the correction is to be transferred (Rule 26.4)

ATTENTION

Failure to correct the defects will result in the international application being considered withdrawn by this receiving Office (see Rule 26.5 for further details)

A copy of this invitation and any attachments has been sent to the International Bureau

☒ and the International Searching Authority

Name and mailing address of the receiving Office
The Patent Office
Cardiff Road, Newport
South Wales NP10 8QQ
Facsimile No.

Authorized officer
Paul Storer
Telephone No. 01633 814427

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The receiving Office has found the following defects in the international application as filed

- 1 As to signature* of the international application (Rules 4.15 and 90.4), the request
- a. ☐ is not signed
 - b. ☐ is not signed by all the applicants.
 - c. ☐ is not accompanied by the statement referred to in the check list in Box No. VIII of the request explaining the lack of the signature of an applicant for the designation of the United States of America.
 - d. ☒ is signed by what appears to be an agent/common representative but
 - ☒ the international application is not accompanied by a power of attorney appointing him
 - ☐ the power of attorney accompanying the international application was not signed by all applicants.
 - e. ☐ other (specify)

* All applicants must sign, including inventors if they are also applicants (e.g. where the United States of America is designated).

- 2 As to indications concerning the applicant, the request (Rules 4.4 and 4.5):

- a. ☐ does not properly indicate the applicant's name (specify).
- b. ☐ does not indicate the applicant's address.
- c. ☐ does not properly indicate the applicant's address (specify)
- d. ☐ does not indicate the applicant's nationality
- e. ☐ does not indicate the applicant's residence.
- f. ☐ other (specify)

- 3 As to the language of certain elements of the international application, other than the description and claims (Rules 12.1(c) and 26.3 *ter(a)* and (c)):

- a. ☐ the request is not in a language of publication accepted by this receiving Office; (the) language(s) accepted by this receiving Office is/are
- b. ☐ the text matter of the drawings is not in a language in which the international application is to be published, which is.
- c. ☐ the abstract is not in the language in which the international application is to be published, which is.

- 4 The title of the invention

- a. ☐ is not indicated in Box No. 1 of the request (Rule 4.1(a)).
- b. ☐ is not indicated at the top of the first sheet of the description (Rule 5.1(a)).
- c. ☐ as appearing in Box No. 1 of the request is not identical with the title heading the description (Rule 5.1(a)).

- 5 As to the abstract (Rule 8):

- a. ☐ the international application does not contain an abstract.

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) SMC 60556/WO

Box No. I TITLE OF INVENTION
Method of Water Treatment

Box No. II APPLICANT

☐ This person is also inventor

Name and address. (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Avecia Inc
1405 Foulk Road
Wilmington DE 19803
USA

Telephone No.

Facsimile No.

Teleprinter No.

Applicant's registration No. with the Office

State (that is, country) of nationality
US

State (that is, country) of residence:
US

This person is applicant for the purposes of ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☒ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address. (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Avecia Limited
PO Box 42
Hexagon House
Blackley, Manchester M9 8ZS
United Kingdom

This person is:

☒ applicant only

☐ applicant and inventor

☐ inventor only (if this check-box is marked, do not fill in below.)

Applicant's registration No. with the Office

State (that is, country) of nationality
GB

State (that is, country) of residence:
GB

This person is applicant for the purposes of ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☒ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE, OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address. (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country.)

REVELL, Christopher
Avecia Limited, Intellectual Property Group
PO Box 42, Hexagon House
Blackley, Manchester M9 8ZS
United Kingdom

Telephone No.

+44 161 721 1142

Facsimile No.

+44 161 721 5801

Teleprinter No.

Agent's registration No. with the Office

☐ Address for correspondence- Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

24 78

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

UNHOCH, Michael Joseph

235 Cherry Lane

Newcastle DE

19720

USA

This person is:

- ☐ applicant only
☒ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

Applicant's registration No. with the Office

State (that is, country) of nationality
 US

State (that is, country) of residence:
 US

This person is applicant for the purposes of ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

Applicant's registration No. with the Office

State (that is, country) of nationality

State (that is, country) of residence:

This person is applicant for the purposes of ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

Applicant's registration No. with the Office

State (that is, country) of nationality

State (that is, country) of residence:

This person is applicant for the purposes of ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

Applicant's registration No. with the Office

State (that is, country) of nationality

State (that is, country) of residence:

This person is applicant for the purposes of ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

Box No. V DESIGNATION OF STATES

Mark the applicable check-boxes below, at least one must be marked.

The following designations are hereby made under Rule 4.9(a):

Regional Patent

- ☒ **AP** ARIPO Patent GH Ghana GM Gambia KE Kenya LS Lesotho, MW Malawi MZ Mozambique SD Sudan SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZM Zambia, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT (if other kind of protection or treatment desired, specify on dotted line)
- ☒ **EA** Eurasian Patent AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP** European Patent AT Austria, BE Belgium, BG Bulgaria, CH & LI Switzerland and Liechtenstein, CY Cyprus, CZ Czech Republic, DE Germany, DK Denmark, EE Estonia, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, HU Hungary, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, RO Romania, SE Sweden, SI Slovenia, SK Slovakia, TR Turkey and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA** OAPI Patent. BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GQ Equatorial Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line)

- | | | |
|---|--|---|
| ☒ AE United Arab Emirates | ☒ HR Croatia | ☒ OM Oman |
| ☒ AG Antigua and Barbuda | ☒ HU Hungary | ☒ PG Papua New Guinea |
| ☒ AL Albania | ☒ ID Indonesia | ☒ PH Philippines |
| ☒ AM Armenia | ☒ IL Israel | ☒ PL Poland |
| ☒ AT Austria | ☒ IN India | ☒ PT Portugal |
| ☒ AU Australia | ☒ IS Iceland | ☒ RO Romania |
| ☒ AZ Azerbaijan | ☒ JP Japan | ☒ RU Russian Federation |
| ☒ BA Bosnia and Herzegovina | ☒ KE Kenya | ☒ SC Seychelles |
| ☒ BB Barbados | ☒ KG Kyrgyzstan | ☒ SD Sudan |
| ☒ BG Bulgaria | ☒ KP Democratic People's Republic of Korea | ☒ SE Sweden |
| ☒ BR Brazil | ☒ KR Republic of Korea | ☒ SG Singapore |
| ☒ BY Belarus | ☒ KZ Kazakhstan | ☒ SK Slovakia |
| ☒ BZ Belize | ☒ LC Saint Lucia | ☒ SL Sierra Leone |
| ☒ CA Canada | ☒ LK Sri Lanka | ☒ SY Syrian Arab Republic |
| ☒ CH & LI Switzerland and Liechtenstein | ☒ LR Liberia | ☒ TJ Tajikistan |
| ☒ CN China | ☒ LS Lesotho | ☒ TM Turkmenistan |
| ☒ CO Colombia | ☒ LT Lithuania | ☒ TN Tunisia |
| ☒ CR Costa Rica | ☒ LU Luxembourg | ☒ TR Turkey |
| ☒ CU Cuba | ☒ LV Latvia | ☒ TT Trinidad and Tobago |
| ☒ CZ Czech Republic | ☒ MA Morocco | ☒ TZ United Republic of Tanzania |
| ☒ DE Germany | ☒ MD Republic of Moldova | ☒ UA Ukraine |
| ☒ DK Denmark | ☒ MG Madagascar | ☒ UG Uganda |
| ☒ DM Dominica | ☒ MK The former Yugoslav Republic of Macedonia | ☒ US United States of America |
| ☒ DZ Algeria | ☒ MN Mongolia | ☒ UZ Uzbekistan |
| ☒ EC Ecuador | ☒ MW Malawi | ☒ VC Saint Vincent and the Grenadines |
| ☒ EE Estonia | ☒ MX Mexico | ☒ VN Viet Nam |
| ☒ ES Spain | ☒ MZ Mozambique | ☒ YU Serbia and Montenegro |
| ☒ FI Finland | ☒ NI Nicaragua | ☒ ZA South Africa |
| ☒ GB United Kingdom | ☒ NO Norway | ☒ ZM Zambia |
| ☒ GD Grenada | ☒ NZ New Zealand | ☒ ZW Zimbabwe |
| ☒ GE Georgia | | |
| ☒ GH Ghana | | |
| ☒ GM Gambia | | |

Check-boxes below reserved for designating States which have become party to the PCT after issuance of this sheet:

☒ Egypt



Precautionary Designation Statement In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

Supplemental Box

If the Supplemental Box is not used, this sheet should not be included in the request.

1 If, in any of the Boxes, except Boxes Nos. VIII(i) to (v) for which a special continuation box is provided, the space is insufficient to furnish all the information, in such case, write "Continuation of Box No. ..." (indicate the number of the Box) and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular

Continuation of Box II

Avecia Inc. - Applicant for all of the designated states except US (United States of America) and MN (Mongolia)

(i) If more than two persons are to be indicated as applicants and/or inventors and no "continuation sheet" is available. In such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below,

Continuation of Box III

Avecia Limited - Applicant for MN (Mongolia) only

(ii) If, in Box No. II or in any of the sub-boxes of Box No. III the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant,

Continuation of Box IV

FAWKES, David Melville
GAIRNS, Raymond Stevenson
LOCKE, Timothy John
MAYALL, John
MORPETH, Fraser Forrest
PARLETT, Peter Michael
SCHMITT, Maja
SHELLER, Alan

(iii) If, in Box No. II or in any of the sub-boxes of Box No. III the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America. In such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor

All of Intellectual Property Group, Avecia Limited, PO Box 42, Hexagon House, Blackley Manchester M9 8ZS, United Kingdom

(iv) If, in addition to the agent(s) indicated in Box No. IV there are further agents. In such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV

(v) If, in Box No. V the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if in Box No. V the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part" in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application,

(vi) If in Box No. VI, there are more than five earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI

2 If, with regard to the precautionary designation statement contained in Box No. V the applicant wishes to exclude any State(s) from the scope of that statement. In such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.

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Box No. VI PRIORITY CLAIM

The priority of the following earlier application(s) is hereby claimed:

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is.		
		national application country or Member of WTO	regional application.* regional Office	international application. receiving Office
item (1) 04/11/2002 4 November 2002	60/423790	US		
item (2)				
item (3)				
item (4)				
item (5)				

☐ Further priority claims are indicated in the Supplemental Box.

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of this international application is the receiving Office) identified above as

☒ all items ☐ item (1) ☐ item (2) ☐ item (3) ☐ item (4) ☐ item (5) ☐ other, see Supplemental Box

* Where the earlier application is an ARIPO application, indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed (Rule 4.10(b)(ii))

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen, the two-letter code may be used)

ISA / EPO

Request to use results of earlier search, reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority).

Date (day/month/year)

Number

Country (or regional Office)

Box No. VIII DECLARATIONS

The following declarations are contained in Boxes Nos. VIII (i) to (v) (mark the applicable check-boxes below and indicate in the right column the number of each type of declaration)

Number of
declarations

- | | | |
|---|--|--|
| ☐ Box No. VIII (i) | Declaration as to the identity of the inventor | |
| ☐ Box No. VIII (ii) | Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent | |
| ☐ Box No. VIII (iii) | Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application | |
| ☐ Box No. VIII (iv) | Declaration of inventorship (only for the purposes of the designation of the United States of America) | |
| ☐ Box No. VIII (v) | Declaration as to non-prejudicial disclosures or exceptions to lack of novelty | |

Box No. IX CHECK LIST; LANGUAGE OF FILING

This international application contains:

(a) In paper form, the following number of sheets

request (including declaration sheets)	8
description (excluding sequence listings and/or tables related thereto)	10
claims	5
abstract	1
drawings	

Sub-total number of sheets 22

sequence listings

tables related thereto

(for both, actual number of sheets if filed in paper form, whether or not also filed in computer readable form, see (c) below)

Total number of sheets 22

(b) ☐ only in computer readable form (Section 801(a)(i))(i) ☐ sequence listings(ii) ☐ tables related thereto(c) ☐ also in computer readable form (Section 801(a)(ii))(i) ☐ sequence listings(ii) ☐ tables related thereto

Type and number of carriers (diskette, CD-ROM, CD-R or other) on which are contained the

☐ sequence listings.☐ tables related thereto:

(additional copies to be indicated under items 9(ii) and/or 10(ii), in right column)

This international application is accompanied by the following item(s) (mark the applicable check-boxes below and indicate in right column the number of each item)

Number of items

- 1 ☒ fee calculation sheet
- 2 ☐ original separate power of attorney
- 3 ☐ original general power of attorney
- 4 ☐ copy of general power of attorney reference number if any
- 5 ☐ statement explaining lack of signature
- 6 ☐ priority document(s) identified in Box No. VI as item(s)
- 7 ☐ translation of international application into (language)
- 8 ☐ separate indications concerning deposited microorganism or other biological material
- 9 ☐ sequence listings in computer readable form (indicate type and number of carriers)
 - (i) ☐ copy submitted for the purposes of international search under Rule 13ter only (and not as part of the international application)
 - (ii) ☐ (only where check-box (b)(i) or (c)(i) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Rule 13ter
 - (iii) ☐ together with relevant statement as to the identity of the copy or copies with the sequence listings mentioned in left column
- 10 ☐ tables in computer readable form related to sequence listings (indicate type and number of carriers)
 - (i) ☐ copy submitted for the purposes of international search under Section 802(b-quarter) only (and not as part of the international application)
 - (ii) ☐ (only where check-box (b)(ii) or (c)(ii) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Section 802(b-quarter)
 - (iii) ☐ together with relevant statement as to the identity of the copy or copies with the tables mentioned in left column
- 11 ☐ other (specify):

Figure of the drawings which should accompany the abstract.

Language of filing of the international application:

Box No. X SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

For

Avacia Inc., Avacia Limited - UNHOCH, Michael Joseph

SCHMITT, Maja



For receiving Office use only

1 Date of actual receipt of the purported international application:	2 Drawings. ☐ received. ☐ not received.
3 Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application.	
4 Date of timely receipt of the required corrections under PCT Article 11(2):	
5 International Searching Authority (if two or more are competent): ISA /	6 ☐ Transmittal of search copy delayed until search fee is paid

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

Brigard & Castro

BOGOTA COLOMBIA

AS 94.160

83

PODER

Yo (nosotros)

domiciliado(s) en

Nombro(amos) a **RAMIRO CASTRO DUQUE y/o HECTOR GOMEZ MEJIA**, de Bogotá Colombia, apoderados verdaderos y legales con poder especial, amplio y suficiente para recabar de las oficinas y autoridades colombianas administrativas judiciales y de policía, en cualquier instancia o recurso la obtención de patentes de invención, registros de marcas diseños industriales modelos de utilidad, depósitos de nombres comerciales y enseñas registros de derechos de autor y contratos sobre los mismos obtención de certificados de obtentor de variedades vegetales así como sus prórogas renovaciones, anotaciones de traspaso cambios de nombre y/o domicilio elaborar tramitar y registrar contratos de licencia y licencias de cualesquiera clases intervenir como demandante o como demandado en cualquier instancia y recurso ante cualquier juez corporación funcionario público o autoridad en acciones judiciales, administrativas y de policía tales como oposiciones al registro de marcas, acciones de caducidad, cancelación y nulidad, acciones reivindicatorias acciones derivadas de la obtención o explotación de licencias acciones de competencia desleal, demandas penales acciones de indemnización de perjuicios, reclamos y observaciones a solicitudes de patentes, diseños industriales modelos de utilidad en el ejercicio de medidas cautelares y en otras acciones o medidas similares

A este efecto lo(s) faculto(amos) para elevar solicitudes formular descripciones enmiendas protestas, declaraciones oposiciones cancelaciones nulidades apelaciones y reclamos pagar impuestos cuotas y gravámenes prescritos por la ley renunciar o desistir a derechos concedidos o en curso de concesión recibir toda clase de documentos y valores, dando el descargo respectivo, y en general para dar ante dichas autoridades todos los pasos necesarios al efecto indicado y tomar todas las medidas que creyeran conducentes al resguardo de mis (nuestros) intereses), con todas las demás facultades legales necesarias

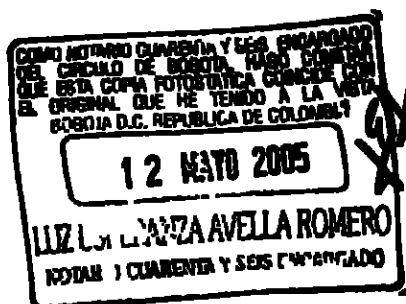
Este poder comprende la facultad de ratificar o confirmar en mi (nuestro) nombre lo actuado así como la facultad de desistir transigir comprometer y la de sustituirlo en todo o en parte y revocar sustituciones Asimismo nombro(amos) a **RAMIRO CASTRO DUQUE y/o HECTOR GOMEZ MEJIA**, domiciliado(s) en la Carrera 7 No 16-56 Piso 9, mis (nuestros) apoderados en Colombia con facultades para recibir notificaciones y designar apoderados judiciales o extrajudiciales

Otorgado y firmado en

hoy de de 200_

Firma

Nombre
Cargo



POWER OF ATTORNEY

I (We) ARCH CHEMICALS INC a corporation organized and existing under the laws of the Commonwealth of Virginia, U S A.

domicled in 501 Merritt 7 P O Box 5204 Norwalk Connecticut 06858-5204 U S A.

Hereby appoint **RAMIRO CASTRO DUQUE** and/or **HECTOR GOMEZ MEJIA**, of Bogotá Colombia my (our) true and lawful attorneys with special ample and sufficient power to obtain from the Colombian administrative judicial and police offices and authorities, in any instance, privileges of patents of invention registration of trademarks industrial designs and utility models registration of commercial names and emblems registration of copyright and contracts related thereto, certificates of obtainers of vegetables varieties as well as extensions renewals and recordal of assignments and changes of name and domicile related to the above to prepare prosecute and register licenses of any kind to act as plaintiff or defendant in any instance or recourse and before any judge corporation public official or authority in judicial administrative and police actions such as oppositions to the registration of trademarks caducity cancellation and nullity actions, claim actions derived from the obtaining or exploitation of licenses action of unfair competition penal demands actions of indemnities for damages claims or observations on patent applications models industrial designs and utility models, in the exercise of preventive measures and in other actions or similar proceedings

To that effect they hereby empowered to file applications formulate descriptions amendments protests, declarations oppositions cancellations nullities appeals and claims to pay taxes quotas and assessments prescribed by law renounce or waive the rights granted or in the process of granting to receive all kinds of documents and valuables giving the respective release of receipt, and in general to take before said authorities the necessary steps to such effect, and any measures that they may deem pertinent to the safeguard of my (our) interest(s) with all the other necessary legal powers

This power includes the faculty to ratify or confirm desist settle and compromise on my (our) behalf and to substitute this power in whole or in part and to revoke substitutions At the same time I (We) hereby appoint **RAMIRO CASTRO DUQUE** and/or **HECTOR GOMEZ MEJIA**, domicled in Carrera 7 No 16-56 Piso 9 my (our) attorney(s) in fact, with power's to receive notifications and to designate judicial and extrajudicial attorneys

Granted and signed in Norwalk Connecticut U S A

this 10 day May of 2004

Signature

Name
Title

ARCH CHEMICALS, INC

Paul J. Crassey
Executive Vice President

APOSTILLE

(Convention de La Haye du 5 octobre 1961)

85 84

1 Country The United States of America

THIS PUBLIC DOCUMENT

2 has been signed by **NANCY O STEVENS**

3 acting in the capacity of **NOTARY PUBLIC**

4 in the State of Connecticut for the term of **June 21, 2001 to June 30, 2006**

CERTIFIED

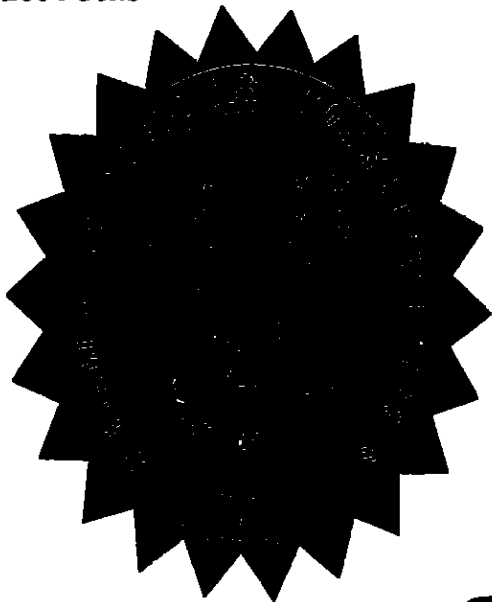
5 at Hartford, Connecticut

6 on **May 14, 2004**

7 by **SUSAN BYSIEWICZ** Secretary of the State of Connecticut

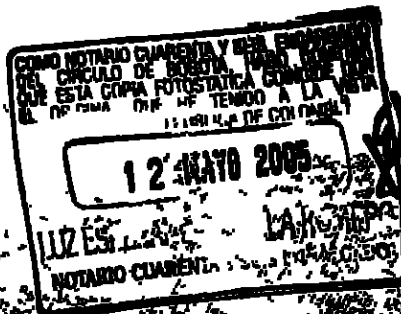
8 Number **2004-5025**

9 Seal



10 Signature

Susan Bysiewicz
Secretary of the State



I PAUL J CRANEY Certify

That ARCH CHEMICALS, INC
is a Corporation duly organized and legally
existing under the laws of the Commonwealth
of Virginia, U S A

That the domicile of said Corporation
is 501 Merritt 7
P O Box 5204
Norwalk, Connecticut 06856-5204
U S A

I, further certify that I am duly authorized to
sign the forgoing instrument in the name of said
corporation and that the purposes for which said
instrument is granted are within the scope of the
objects or activities of said corporation,
in accordance with the Articles of Amendment &
Restatement of the Articles of Incorporation,
issued in the City of Richmond, Virginia, U S A
and filed February 3, 1999

Signed in Norwalk, Connecticut, U S A
Dated 10 May, 2004

Paul J Craney
Paul J Craney
Executive Vice President

STATE OF CONNECTICUT)
)
COUNTY OF FAIRFIELD)

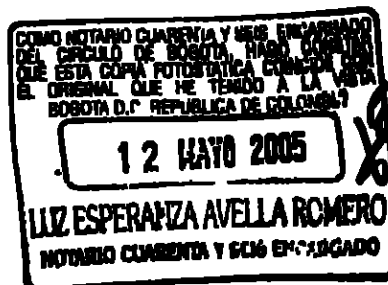
On this 10th day May, 2004, before me a
Notary Public in and for said County and State, personally
appeared PAUL J CRANEY, who acknowledged himself to be the
Executive Vice President of ARCH CHEMICALS, INC, and that he as
such Executive Vice President, being authorized so to do,
executed the foregoing instrument for the purposes therein
contained, by signing the name of the corporation by himself as
Executive Vice President

In witness whereof I hereunto set my hand

Nancy Peters
Notary Public

Seal

My Commission Expires
My Commission Exp. June 30, 2005



TRADUCCION DE LOS SELLOS QUE SE ENCUENTRAN EN EL PODER
OTORGADO POR ARCH CHEMICALS, INC , UNA COMPAÑIA DOMICILIADA
EN 501 Merritt 7, P O Box 5204, NORWALK, CONNECTICUT
06856-5204, ESTADOS UNIDOS DE AMÉRICA, A LOS DOCTORES
RAMIRO CASTRO DUQUE Y/O HECTOR GOMEZ MEJIA,
OTORGADO Y FIRMADO EL 10 DE MAYO DE 2004
FIRMADO PAUL J CREANEY, VICEPRESIDENTE EJECUTIVO

Yo, PAUL J CRANEY CERTIFICO

Que ARCH CHEMICALS, INC , es una Corporación debidamente
organizada y en existencia bajo las leyes del Estado de
Virginia, Estados Unidos de América

Que el domicilio de la Corporación es

501 Merritt 7, P O BOX 5204

Norwalk, Connecticut 06856-5204

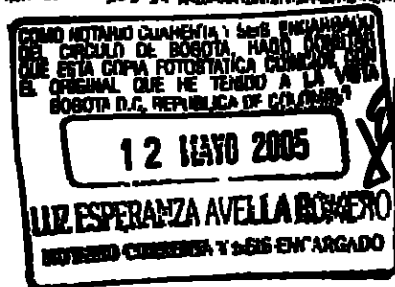
Estados Unidos de América

Certifico además que estoy debidamente autorizado para
firmar el instrumento adjunto a nombre de dicha
Corporacion, y que los fines para los cuales se otorga
dicho instrumento se encuentran dentro del alcance de los
objetos o actividades de dicha Corporación, de conformidad
con los Artículos de Modificación y Actualización de los
Artículos de Constitución, expedidos en la ciudad de
Richmond, Virginia, Estados Unidos de América, y radicados
el 3 de Febrero, 1999

Firmado en Norwalk, Connecticut, Estados Unidos de América

Fecha 10 de Mayo de 2004

FIRMADO PAUL J CRANEY, VICEPRESIDENTE EJECUTIVO



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87

ESTADO DE CONNECTICUT - CONDADO DE FAIRFIELD

Este día 10 de Mayo de 2004 ante mí, Notario Público en y para dichos Condado y Estado, personalmente compareció PAUL J CRANEY, a quien conozco y reconoció que es el Vicepresidente Ejecutivo de ARCH CHEMICALS, INC , y que en su calidad de Vicepresidente Ejecutivo, debidamente autorizado para hacerlo, ejecutó el instrumento adjunto para los fines allí especificados, y al firmar a nombre de la Corporación en su nombre en su calidad de Vicepresidente Ejecutivo

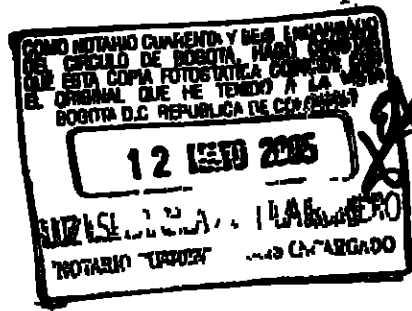
En testimonio de lo anterior firmo el presente documento

FIRMADO NANCY O STEVENS, NOTARIO PUBLICO, CON COMISIÓN
HASTA EL 30 DE JUNIO DE 2006

HAY SELLO EN RELIEVE DEL NOTARIO



2



88

APOSTILLA

CONVENIO DE LA HAYA DEL 5 DE OCTUBRE DE 1961

1 PAIS ESTADOS UNIDOS DE AMERICA

EL PRESENTE DOCUMENTO PUBLICO

2 HA SIDO FIRMADO POR NANCY O SIEVENS

3 ACTUANDO EN SU CAPACIDAD DE NOTARIO PUBLICO

4 EN EL ESTADO DE CONNECTICUT POR UN TERMINO DE 21 DE
JUNIO, 2001 A 30 DE JUNIO, 2006

CERTIFICADO

5 EN HARTFORD, CONNECTICUT

6 EL 14 DE MAYO DE 2004

7 POR SUSAN BYSIEWICZ, SECRETARIO DE ESTADO DE
CONNECTICUT

8 BAJO EL NO 2004-5025

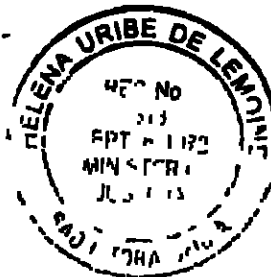
9 SELLO ESTADO DE CONNECTICUT

10 FIRMADO SUSAN BYSIEWICZ, SECRETARIO DE ESTADO

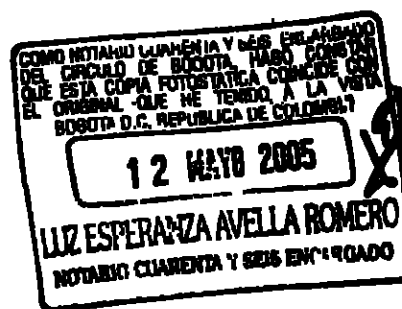
LA TRADUCTORA OFICIAL

Helena Uribe de Lemoine

HELENA URIBE DE LEMOINE



3





ORGANIZACION ELECTORAL
REGISTRADURIA NACIONAL DEL ESTADO CIVIL

GAVIRI A

89

REGISTRO CIVIL DE DEFUNCIÓN

Indicativo
Serial

5562241

Datos de la oficina de registro									
Clase de oficina	Registraduría	Notaría	X	Consulado	Corregimiento	Insp. de Policía	Código	9795	
País: COLOMBIA CUNDINAMARCA BOGOTA D.C. NOTARIA 32.									

Datos del inscrito	
Apellidos y nombres completos CASTRO DUQUE RAMIRO	
Documento de identificación (Clase y número)	Sexo (en Letras)
C.C. No. 170322 DE BOGOTA	MASCULINO

Datos de la defunción	
Lugar de la Defunción País Departamento Municipio Corregimiento o Inspección de Policía COLOMBIA CUNDINAMARCA BOGOTA D.C.	
Fecha de la defunción	Hora
Año 2004 Mes 10 Día 30 04:10 PM	Número de certificado de defunción A- 2094375.
Presunción de muerte	
Lugar donde se produjo la defunción	Fecha de la defunción
Documento presentado	Nombre y cargo del funcionario
Autorización judicial ☐ Certificado Médico X	ANDRES DIAZ CAMPOS. R. M. No. 79982662

Datos del denunciante	
Apellidos y nombres completos EDGAR DAVID REGINO H.	
Documento de identificación (Clase y número)	Firma
C.C. No. 15.030.154 DE LORICA/ CORDOBA	

Primer testigo	
Apellidos y nombres completos	
Documento de identificación (Clase y número)	Firma

Segundo testigo	
Apellidos y nombres completos	
Documento de identificación (Clase y número)	Firma

Fecha de inscripción	Notario y firma del Registrador que autoriza
Año 2004 Mes 11 Día 02	BLANCA RESTREPO NOTARIO

PADRES: ALFONSO CASTRO	ESPACIO PARA NOTAS
MERCEDES DUQUE	

ORIGINAL PARA LA OFICINA DE REGISTRO

NOTARIA 32

DEL CIRCULO DE SANTA FE DE BOGOTA, D.C

Germán Eleázar Moreno L.
Notario

COMO SECRETARIO DELEGADO DE LA NOTARIA TREINTA Y DOS (32) DEL
CIRCULO DE BOGOTA

CERTIFICO QUE.

La presente acta es fiel copia del original tomada del registro
civil de defunciones serial indicativa número **56224**
que expido en la ciudad de Bogotá D.C. hoy **05 NOV 2004**

SECRETARIO DELEGADO

HELENN FIORI
SECRETAR C DEL PADO PANACOTIAS
DECRETO 1334 DE 1988

REQUISITOS NECESARIOS PARA PRESENTACION Y AGILIZACION DEL TRAMITE

		USUARIO	RADICADOR
PATENTE DE INVENCION	MODELO DE UTILIDAD	()	☒
- Indicación de que se solicita la concesión de una patente		()	☒
- Datos de identificación del solicitante o de la persona que se presenta la solicitud		()	☒
- Descripción de la invención		()	☒
- Dibujos de ser estos pertinentes		()	☒
- Comprobante de Pago de las tasas establecidas		()	☒

COMPLETA () **INCOMPLETA** () ()

DISEÑO INDUSTRIAL ()

-	Indicación de que se solicita el registro de Diseño Industrial	()	()
-	Datos de identificación del solicitante o de la persona que presenta la solicitud	()	()
-	Representación grafica o fotografica del Diseño Industrial o muestra del Material que incorpora el diseño	()	()
-	Comprobante de pago de las tasas establecidas	()	()

COMPLETA () **INCOMPLETA** () ()

ESQUEMA DE TRAZADO ()

-	Indicacion de que solicita el registro de un Esquema de trazado	()	()
-	Datos de identificación del solicitante o de la persona que presenta la solicitud	()	()
	Representacion grafica del esquema de trazado	()	()
	Comprobante de pago de las tasas establecidas	()	()

COMPLETA () **INCOMPLETA** () ()

Firma Responsabile**Fecha:**

GOVERNMENT OF CANADA
 MINISTER OF INDUSTRY
 Ottawa, Ontario
 K1A 0S5
 Canada

91 42

Industria y Comercio
SUPERINTENDENCIA

2020
Bogotá, D C ,

Doctor
HECTOR GOMEZ MEJIA
Apoderado
ARCH CHEMICALS, INC

Oficio N° 05391

ASUNTO	Radicación N°	05-53231
	Solicitud internacional	PCT/GB2003/004649
	Fecha inicio fase nacional	07/06/2005
	Trámite	011
	Evento	379
	Actuación	430
	Folios	001

Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Unica de la Superintendencia de Industria y Comercio, se le comunica que

- La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante (Art 26-k) Decisión 486)
- Debe aclarar el nombre del solicitante, por cuanto la publicación internacional difiere del petitorio presentado en fase nacional

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Unica N° 10 de 2001.


ALIX CARMENZA CESPEDES DE VERGEL
Jefe de la División de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista de fecha, 18 JUL 2005

202030

Carrera 13 No. 27-00 Piso 5 y 10
Conmutador 334 12 21-2-3-4
Fax 281 31 25 e-mail: info@ic.gov.co
Santa Fe de Bogotá D.C - Colombia