

CASTELLANOS & CO LTDA
ABOGADOS
Calle 94 A No. 7 A-09
Bogotá, D.C. - COLOMBIA

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
No. 07-087934- -00003-0000
Fecha: 2008-02-12 15:16:38 Dep 2020 NUECREACION
Tra. 11 PATEN. D.Y. Ene 375 FASE NACIONAL
Act. 538 PETICION FOLIOS 2

Señor

Jefe de la División de Nuevas Creaciones

Superintendencia de Industria y Comercio

Ministerio de Comercio, Desarrollo, Industria y Turismo

E. S. D.

Re.: Expediente No. **07.087.934**

Solicitud del examen de patentabilidad correspondiente a la Patente PCT
Entrada en Fase Nacional, para:

"PROCESO PARA LA PRODUCCION DE OXIDO DE MAGNESIO"

Solicitante: **BHP BILLITON SSM TECHNOLOGY PTY LTD**

SOLICITUD EXAMEN DE PATENTABILIDAD

(CAPITULO I)

Yo, **MARGARITA CASTELLANOS ABONDANO**, mayor de edad, identificada y domiciliada como aparece al pie de mi firma, obrando en mi calidad de apoderada de la sociedad solicitante, atentamente me permito solicitar a Ud. que se realice el examen de patentabilidad de la invención arriba citada, para lo cual anexo el comprobante de pago No. **08- 9.550** de **Febrero 4** de **2008**, correspondiente a la tasa establecida para dicha solicitud.

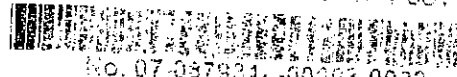
En consecuencia, atentamente solicito a Ud. se anexe este memorial junto con el comprobante de pago al expediente correspondiente a esta solicitud de Patente PCT Entrada en Fase Nacional, y se continúe con su tramitación.

Señor Jefe,

Margarita Castellanos Abondano
Margarita Castellanos Abondano
C.C. No. **39.779.654** de Usaquén
T.P.A. No. **70.819** del C. S. J.
Calle 94 A No. 7 A-09 - Bogotá, D.C.

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 07-037924-00003-0030

Fecha: 2008-02-12 15:16:35 - Def. 2020 NÚMERO DE REACCIÓN:
Tra 11 PATENTE Y II LVS: 378 BASE NACIONAL
Act 539 PETICIÓN FOLIOS: 2

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 08 - 9,550
FECHA : FEBRERO 4 DE 2008

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	Vr. PAGO
ALVARO CASTELLANOS	CONSIGNACION	BANCO DE BOGOTA	062754387	83328	04/02/2008	2,503,000.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01 SOLICITUDES	85 EXAMEN DE PATENTABILIDAD DE INVEN	420,000.00
		TOTAL :	\$ 420,000.00

SON: CUATROCIENTOS VEINTE MIL PESOS

RESPONSABLE : _____

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

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DIVISIÓN DE NUEVAS CREACIONES

RADICACIÓN EXPEDIENTE No. 07-87934

EL EXTRACTO DE LA PRESENTE SOLICITUD DE **PATENTE DE INVENCION**

FUE PUBLICADO EN LA GACETA DE PROPIEDAD INDUSTRIAL No **587** DE

FECHA **18 DE ENERO DE 2008** EL TÉRMINO HÁBIL SEÑALADO POR LA LEY

EXPIRA EL **16 DE ABRIL DE 2008**

NOTA: Dentro del plazo de los seis (6) meses siguientes a partir de la fecha de publicación en la gaceta de Propiedad Industrial, deberá solicitar y cancelar el examen de patentabilidad so pena de que la solicitud caiga en abandono, de acuerdo con lo establecido en el Artículo 44 de la Decisión 486/2000.

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS.

SI _____ NO X

SD

United States Patent Office

3,085,858

Patented Apr. 16, 1963

1

3,085,858

RECOVERY OF MAGNESIUM COMPOUNDS

FROM ORES

Philip W. Trubey, Inuit, Quebec, and Ian B. Bruce, Aymer, Quebec, Canada, assignors to Aluminium Laboratories Limited, Montreal, Quebec, Canada, a company of Canada

No Drawing. Filed Nov. 9, 1960, Ser. No. 68,182
Claims priority, application Great Britain Nov. 9, 1959
5 Claims. (Cl. 23-129)

The present invention relates to the extraction of magnesium, in the form of salts which may be calcined to produce magnesia. It is an object of the present invention to provide a process by means of which magnesium salts in a comparatively pure form may be recovered from minerals such as brucite or dolomite, which contain both calcium and magnesium.

It is already known that magnesium bisulphite can be extracted in relatively pure form from such minerals by leaching the mineral with sulphur dioxide in the presence of water. If the pH is controlled in such operation to a value between 4.5 and 5.5 there is little simultaneous dissolution of calcium as calcium bisulphite. It is, however, an object of the present invention to improve on the known process, both as regards to the degree of separation of the magnesium from calcium and as to the rate and completeness of the extraction of magnesium from the mineral.

It is found in accordance with the present invention that the simultaneous passage of carbon dioxide with sulphur dioxide in the leaching operation referred to above improves the rate of magnesium extraction from the mineral and at the same time has the effect of depressing the relative amount of calcium extracted. The result is a purer magnesium bisulphite solution than was obtained by the prior art process. Such solution may be used directly, for example, in a paper mill, or may be subjected to further processing.

It is found that calcium is dissolved in comparatively negligible quantities, i.e. under about 3% of the quantity of magnesium when the pH of the leaching solution is controlled to a value of 4.5-5.5 and this control of the pH value can readily be effected by control of the rate at which the reactants are brought together, i.e. the rate at which the ore is added to the leaching liquor. At pH values less than about 4.5, the solubility of calcium as calcium bisulphite rises fairly sharply and it is certainly preferred to carry out the process of the present invention at a pH value above 5.0.

The effectiveness of the use of carbon dioxide in conjunction with sulphur dioxide for sharpening the separation of magnesium from calcium is shown by the following example.

In water saturated with sulphur dioxide and carbon dioxide at room temperature and at pH 4.5, magnesium (as MgO) has a solubility of 14.5 gms. per litre and calcium (as CaO) has a solubility of only 0.32 gm. per litre, thus giving a MgO:CaO ratio of 45:1. In water saturated with sulphur dioxide gas alone, it is found that the solubility of calcium (as CaO) increases to 2.32 gms. per litre, giving a MgO:CaO ratio of only 6.25:1.

In addition to increasing the efficiency of the separation of magnesium from calcium in the sulphur dioxide leaching process, the use of carbon dioxide very materially increases the speed and efficiency of the leaching operation. In one test finely ground brucite ore was added to a solution, maintained in a saturated condition by gassing with both sulphur dioxide and carbon dioxide, at pH 5.0 over a period of 15 minutes and in this time 92.5% of the mag-

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nesium in the ore was leached out. The pH value was maintained at plus or minus 0.25 of the stated value by control of the rate of addition of the powdered brucite ore.

Under identical conditions, using sulphur dioxide alone, it took 25 minutes to add the same quantity of finely ground ore without departing from the stated pH value and an extraction of only 55.5% of the magnesium was obtained.

The rate at which the ore can be added is dependent on the fineness of the grinding and the actual characteristics of the mineral, which vary from sample to sample, depending upon origin.

By the method above described a purer solution of magnesium bisulphite may be obtained than was possible using sulphur dioxide alone, and such magnesium bisulphite solution may be produced more rapidly.

According to a further development of the invention magnesium sulphite is recovered in the solid state by treating the magnesium bisulphite solution thus produced with magnesium oxide or magnesium hydroxide in excess of the stoichiometric quantity required to convert the magnesium bisulphite in the solution to magnesium sulphite.

Magnesium oxide or hydroxide is added in sufficient quantity to raise the pH of the liquor to about 9.0 and to achieve this about 10% in excess of the stoichiometric quantity is required. The addition of magnesium oxide to magnesium bisulphite solution leads to the precipitation of magnesium sulphite hexahydrate. With the addition of the stoichiometric quantity of magnesium oxide or hydroxide, only about 60% of the magnesium is precipitated in the form of the sulphite from a magnesium bisulphite solution of initial pH 4.5. The addition of 10% excess magnesium oxide beyond the stoichiometric quantity raises the precipitation of the magnesium sulphite hexahydrate to about 80%. The excess magnesium oxide or hydroxide is recovered with the magnesium sulphite in the filter cake.

Magnesia may be obtained from the precipitated magnesium sulphite hexahydrate by calcination which simultaneously regenerates the sulphur dioxide. The sulphur dioxide evolved in the calcination is preferably recycled for the treatment of fresh ore, whilst a little more than half of the magnesium oxide (magnesia) thus produced is retained for addition to further quantities of magnesium bisulphite solution.

We claim:

1. A process for the extraction of magnesium from a mineral containing magnesium and calcium which comprises leaching the magnesium therefrom by treating said mineral with a saturated aqueous solution of sulphur dioxide and carbon dioxide whilst maintaining the pH value of said solution within the range of 4.5 to 5.5 to produce a solution of magnesium bisulphite which contains calcium, in dissolved compound form, in less amount, measured as CaO, than about 3% of the magnesium measured as MgO.

2. A process for the extraction of magnesium as claimed in claim 1, which comprises adding finely ground mineral to a solution of sulphur dioxide and carbon dioxide, maintained in a saturated condition by passage of a stream of both gases therethrough, the mineral being added at such rate that the pH value of the solution is maintained at about 5.0.

3. A process for the extraction of magnesium as claimed in claim 1, further comprising adding a substance selected from the group consisting of magnesium hydroxide and magnesium oxide to said solution of magnesium bisulphite in a quantity in excess of the stoichiometric quantity re-

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3,085,858

quired to convert the magnesium bisulphite of said solution to magnesium sulphite and collecting the resultant precipitate containing magnesium sulphite hexahydrate.

4. A process for the extraction of magnesium as claimed in claim 3, wherein the substance selected from the group consisting of magnesium hydroxide and magnesium oxide is added in such quantity as to raise the pH value of the solution to about 9.0.

5. A process for the extraction of magnesium as claimed in claim 3, further comprising calcining the collected

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precipitate to convert substantially the whole of the magnesium content to magnesia oxide.

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D1 58

United States Patent [19]

Najmr et al.

[11] Patent Number: 4,474,737

[45] Date of Patent: Oct. 2, 1984

[54] PROCESS OF PURIFICATION OF MAGNESIC RAW MATERIAL

[75] Inventors: Stanislav Najmr, Prague; Zdenek Jerman, Usti n/L.; Jaroslav Kralicek, Prague, all of Czechoslovakia

[73] Assignee: Vysoka, skola chemiko-technologicka, Prague, Czechoslovakia

[21] Appl. No.: 457,046

[22] Filed: Jan. 10, 1983

[30] Foreign Application Priority Data

Jan. 14, 1982 [CS] Czechoslovakia 297-82

[51] Int. Cl.³ C01D 5/16

[52] U.S. Cl. 423/155; 23/293 R;

23/304; 423/173; 423/242; 423/512 A

[58] Field of Search 423/173, 242 A, 512 A,

423/155; 23/293 R, 304

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U.S. PATENT DOCUMENTS

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Primary Examiner—John Doll
Assistant Examiner—Wayne A. Langel

[57] ABSTRACT

Process of purification of magnesian raw material. Sulphur dioxide is allowed to react with an aqueous suspension of calcinated magnesite, crude or contaminated magnesium oxide, magnesium hydroxide, hydrated magnesium carbonates, or crude crystals of magnesium sulphite, and, after reaching a pH of 3 to 7.5 the reaction mixture is separated into a solid phase at least one fraction of which is rich in $MgSO_3 \cdot xH_2O$, wherein x stands for 3 or 6, and at least one fraction containing concentrated impurities. The whole process is carried out at least once. A reaction mixture having a pH below 5 can be preferably transferred to pH 5.2 by the addition of an alkali, e.g. magnesium oxide or magnesium hydroxide, whereupon separation of at least two fractions of the solid phase is accomplished. The fractions obtained can be further purified by mixing in a hydrophilic liquid, and by a following separation. The fraction of crude magnesium sulphite crystals can be heated to a temperature over 60 degrees C., preferably to 90 to 100 degrees C., whereupon the solution containing magnesium sulphite is separated from solid impurities, or the treated mixture is cooled to a temperature below 60 degrees C. and solid phases are separated into one or more fractions rich in $MgSO_3 \cdot xH_2O$ and to one or more fractions mainly containing impurities. Filtration, sedimentation, or centrifugation can be used for the separation.

8 Claims, No Drawings

PROCESS OF PURIFICATION OF MAGNESIC RAW MATERIAL

Magnesite is the most important natural magnesian raw material. Before its industrial employment, it is usually treated by calcination in order to produce magnesium oxide, which has more advantageous physical and chemical properties. The traditional production of magnesite refractory linings is based on this, and calcinated magnesite is also now used in the desulphurization of flue gases and in the production of cellulose by magnesium bisulphite technology.

Serious difficulties are caused by impurities in all these cases; such impurities are contained in natural magnesite in the amount of 5 to 25% by weight. This is why several technologies for producing pure magnesium oxide from magnesite have been proposed. Nevertheless, these have the drawback that they consume expensive chemicals (e.g. HNO_3 and NH_3 in the case of nitrate technology), less valuable by-products are produced, and they are more demanding as far as investment and energy are concerned.

These drawbacks are eliminated by the process of separation of impurities in the treatment of calcinated magnesite, contaminated magnesium oxide, magnesium hydroxide, or hydrated magnesium carbonates in accordance with the invention. In such method sulphur dioxide is allowed to react with an aqueous suspension of calcinated magnesite, contaminated magnesium oxide, magnesium hydroxide, hydrated magnesium carbonates, crude crystals of magnesium sulphite, or with an aqueous suspension of a mixture of these compounds. After reaching a pH of 3 to 7.5 the reaction mixture of the solid phase is separated into one or more fractions rich in $MgSO_3 \cdot xH_2O$ wherein x stands for 3 or 6, and into one or more fractions mainly containing impurities, the whole process being carried out at least once.

Calcinate of magnesium sulphite can, for example, also serve as the contaminated magnesium oxide; such sulphite originates in the magnesite process of desulphurization of air pollutants. Besides impurities originating from magnesite, it also contains impurities caught from desulphurized air pollutants such as fly-ash from waste gases.

The invention utilizes the known fact that $MgSO_3$ has a very low solubility in water. A metastable solution can, however, be prepared under certain, relatively easily realizable conditions, from which solution crystallohydrate $MgSO_3 \cdot xH_2O$ with 3 or 6 molecules of crystal water and appreciably different sizes of crystals can be prepared under specific conditions. $MgSO_3 \cdot 3H_2O$ has a crystal size of around 0.01 mm and $MgSO_3 \cdot 6H_2O$ has a crystal size of around 1 mm. Different sizes of particles and densities thereof permit the separation of solid impurities with a wide range of densities from magnesium sulphite crystals using one-stage crystallization or repeated crystallization, if need be, followed by sedimentation, filtration or centrifugation.

For example, in the treatment of magnesites of the silicate type, it is advantageous to treat $MgSO_3 \cdot 3H_2O$ because the SiO_2 contained in it is present in a coarse form, and it is easily separated from the fine $MgSO_3 \cdot 3H_2O$. On the contrary, in the case in which the ferric type of magnesite is treated, or when it is necessary above all to separate iron, it is advantageous to operate in the region of $MgSO_3 \cdot 6H_2O$, because fine ferruginous

sludge is produced from which rough crystals are also easily separated.

A very fine sludge of impurities is produced by over-acidification, for example, by introducing an excess of SO_2 below a pH=5, the pH being then raised to a pH over 5.2 by the addition of an alkali. Temporary dissolution of impurities, especially of iron, takes place by reason of over-acidification; their repeated precipitation takes place in a fine form, which form is easily separable from rough crystals.

In the separation of impurities by the process according to the invention, sometimes, contrary to the above, a part of the impurities is stripped into the fraction containing sulphite crystals. It is then possible to subject the fraction obtained by separation to repeated separation in a second or even a still further stage. Separation of impurities is further improved by a simple operation. A part of the impurities can be contained in the original sulphite crystals, that is, it can be a part of the crystals themselves. These impurities are not then separated by the above described separation. In this case, magnesium sulphite crystals are transferred into a liquid phase (they are dissolved) and then they are again separated. Substantially purer crystals are thus formed, and solid impurities are then separated from them; this can be simply carried out by allowing sulphur dioxide to react with a suspension containing magnesium sulphite, whereby water-soluble $Mg/HSO_3^{1/2}$ is formed; which is transferred back to $MgSO_3$ by an alkali addition; preferably MgO or $Mg(OH)_2$, so that magnesium sulphite crystallizes out. Alternatively, it is possible to dissolve the aqueous suspension of the crude magnesium sulphite crystals by heating them to a temperature over 60 degrees C., preferably to 90 to 100 degrees C.; solid impurities are then removed from magnesium sulphite by separation.

The process for the purification of magnesium raw materials according to the invention is simple, undemanding as far as investment and energy are concerned, and very effective. The transformation of magnesium raw material to magnesium sulphite is a precondition; however, magnesium sulphite is an intermediate or by-product of several known and industrially employed technologies. In such cases, the employment of the process according to the invention is very easy, and the given technology gains wholly new possibilities without appreciable disadvantages. Thus, for example, in the desulphurization of the waste gases from thermal power stations by the magnesite process, magnesium sulphite is formed as an intermediate; such sulphite is thermally split to magnesium oxide and sulphur dioxide. Magnesium oxide, however, contains approximately 30% by weight of impurities, so that it is unusable as a product. When this crude magnesium sulphite is purified by the process according to the invention, magnesium oxide containing up to 99.5% by weight of MgO is obtained; this is a required product, for example, in the rubber industry, in the production of transformer sheets, or in the production of sintered magnesite.

EXAMPLE 1

1 m³ of water was placed in a glass reactor having a conical bottom and a cooling coil; 71 kg of calcinated magnesite (composition: 77.2% of MgO , 4.1% of SiO_2 , 2.3% of CaO , 7.14% of R_2O_3 , 8.1% of losses at annealing, all percentages being by weight) was fed into the reactor, and SO_2 from a supply thereof stored under pressure in a container was introduced under stirring.

The reaction course was followed by the determination of the pH of the reaction mixture. The pH fell from the initial value of 8.5 to 6 within 15 minutes; the temperature was kept at 35 degrees C. by cooling. Stirring was then stopped, and the contents of the reactor were allowed to rest. A light layer of crystals quickly grew in the conical bottom of the reactor, a layer of deeply brown suspension was present above the layer of crystals. The depth of the layer of light crystals did not increase after 3 minutes; the light crystal layer was discharged through the reactor bottom outlet into a stirred reservoir after one more minute. The volume of this light suspension was 0.25 m³. By analytical determination and microscopic observation it was found that the light crystal was MgSO₃·6H₂O.

The deeply brown suspension which remained in the glass reactor was allowed to settle for 30 minutes; during this time it separated into a clear upper layer having a volume of 0.6 m³ and a sludge lower layer having a volume of 0.15 m³. The lower layer was discharged to waste; the upper layer was left in the reactor and the suspension of MgSO₃·6H₂O from the reservoir was reintroduced into it. After a short stirring, the suspension was allowed to settle for four minutes, and the lower layer having a volume of 0.25 m³ containing MgSO₃·6H₂O crystals was then discharged. After 30 minutes, the remaining sludge layer was also separated into fractions of a clear liquid and a brown sediment. The brown sediment, in the amount of 50 L, was discharged into waste, and 550 L of the remaining clear liquid was used for the preparation of a suspension of calcinated magnesite for the next charge.

A sample of the MgSO₃·6H₂O crystals produced was calcinated at 1100 degrees C. Magnesium oxide was obtained which contained 94.0% of MgO, 2.3% of SiO₂, 1.6% of CaO, 1.7% of R₂SO₃, and 0.2% of losses by annealing, all percentages being by weight. From the mass balance, it was found that 82% by weight of the MgO contained in the raw material was transformed into MgSO₃·6H₂O crystals, 3.5% by weight was transformed into drained sludges, and 14% by weight was in the liquid phase as a MgSO₃ solution and MgSO₄ formed by oxidation.

EXAMPLE 2

1 m³ of water was placed in a glass reactor having a conical bottom and a cooling coil; 71 kg of calcinated magnesite (composition: 77.2% of MgO, 4.1% of SiO₂, 2.3% of CaO, 7.1% of R₂O₃, and 8.1% of losses by annealing, all percentages being by weight) was fed into the reactor and SO₂ from a pressure container therefor was introduced into the reactor under stirring, the pH fell from an initial value of 8.5 to 3.8 within 30 minutes, and the temperature rose to 65 degrees C. Cooling of the reactor was then started, and 72 kg of calcinated magnesite was added to the reactor within five minutes. The pH was thus raised to a value of 6.2. The temperature of the contents of the reactor was maintained within the limits of 35 to 42 degrees C. for 20 more minutes.

The contents of the reactor were mixed by a cyclone thickener for 10 minutes. 0.5 m³ of MgSO₃·6H₂O crystals and 0.55 m³ of a suspension of brown sludge were obtained. The suspension of crystals was purified from the liquid phase using a filtration centrifuge. 250 kg of moist crystals of yellowish color being obtained. The suspension of brown sludge was filtered using a vacuum drum filter, 23.5 kg of brown filter cake being obtained.

Analytical determination revealed the following composition of the components:

	MgO	CaO	SiO ₂	Fe
brown cake (% by weight)	9.1	5.25	6.44	8.4
moist crystal (% by weight)	18.6	0.43	—	0.21

EXAMPLE 3

250 kg of moist crystals obtained by the process according to Example 2 was suspended in 1.6 m³ of a solution containing 5% by weight of MgSO₄ and saturated MgSO₃ at a temperature of 25 degrees C. The thus produced suspension was heated to 99 degrees C. by passing it through a tubular heat exchanger, the suspension then being lead continuously into a centrifugal filter. 1.5 m³ of filtrate was obtained which was allowed to cool freely. Clear white crystals were formed in the course of cooling. The second day, when the temperature of the suspension fell to 25 degrees C., a liquid phase separated from crystals in the centrifugal filter. 220 kg of moist MgSO₃·6H₂O crystals was obtained; such crystals contained: 17.08% of MgO, 0.1% of Fe, 0.002% of CaO, and 0.01% of SiO₂, all percentages being by weight.

Although the invention is illustrated and described with reference to a plurality of embodiments thereof, it is to be expressly understood that it is in no way limited to the disclosure of such preferred embodiments but is capable of numerous modification within the scope of the appended claims.

We claim:

1. A process of purification of magnesic raw materials, comprising the following steps in the order named: (1) allowing sulphur dioxide to react with an aqueous suspension of magnesic raw material chosen from the group consisting of calcinated magnesite, crude magnesium oxide, contaminated magnesium oxide, magnesium hydroxide, hydrated magnesium carbonates, crude crystals of magnesium sulphite, and mixtures of two or more of the above materials to form a solid phase composed of at least one fraction rich in MgSO₃·XH₂O wherein X stands for 3 or 6, and at least one other fraction containing predominately solid impurities, and, (2) separating the solid phase into said at least one fraction rich in MgSO₃·XH₂O, and into said at least one other fraction containing concentrated impurities.

2. The process according to claim 1, wherein the recited steps in the order named are repeated a plurality of times.

3. The process according to claim 1, wherein, after the reaction mixture has reached a pH below 5 the pH is adjusted to a value over 5.2 by the addition of an alkali, whereupon separation of at least two fractions of the solid phase is accomplished.

4. A process according to claim 3, wherein the alkali is chosen from the group consisting of magnesium oxide and magnesium hydroxide.

5. A process according to either of claims 1 or 4, wherein the fraction rich in MgSO₃·XH₂O is mixed with a hydrophilic liquid and is subjected to further separation.

6. A process according to claim 5, comprising heating the fraction rich in MgSO₃·XH₂O to a temperature over 60° C., whereupon the solution containing magnesium sulphite is separated from said impurities.

7. A process according to claim 6, wherein the fraction of crude crystals of magnesium sulphite which is mainly in the form of MgSO₃·6H₂O is heated to a temperature in the range of 90 to 100 degrees C.

8. A process according to claim 1, further comprising the steps of forming an aqueous suspension of the solid fraction of magnesium sulphite crystals formed in the process of claim 1, the solid fraction being mainly in the

form of MgSO₃·6H₂O, heating said aqueous suspension to a temperature over 60 degrees C., cooling the thus heated mixture to a temperature of below 60 degrees C., and separating the solid phase into one or more fractions rich in MgSO₃·XH₂O, wherein X stands for 3 or 6, and to one or more fractions mainly containing impurities.

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIRECCION DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogada
MARGARITA CASTELLANOS

ASUNTO	Radicación	07-87934
	Trámite	311
	Evento	378
	Actuación	519
	Oficio	03
	Folios	03

#04552

Patente de Invención ☒ Patente de Modelo de Utilidad ☐

Vía PCT (fase nacional) ☒ Cap. I ☒ Cap. II ☐

No. Sol. Internacional: PCT/AU2006/000094 ✓
Fecha de Presentación Internacional: 30 de enero de 2006 ✓

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1. Documentos estudiados

Descripción:	Folios: 23 a 33	como se radicó inicialmente
Reivindicaciones:	Folios: 34 a 38	como se radicó inicialmente
Figuras:	Folios: 39 a 41	como se radicó inicialmente
Prioridad:	AU2005900431, 1 de febrero de 2005	

2. Objeto de la invención

Título de la invención:
Proceso para la producción de óxido de magnesio (folio 1).

El problema planteado en esta solicitud es como recuperar el magnesio descartado de los procesos de lixiviación a presión de menas de lateritas para usarlo en el proceso de recuperación hidrometalúrgica del níquel como neutralizante.

Para solucionar este problema técnico se desarrolla un proceso para la recuperación del óxido de magnesio.

Clasificación internacional de Patentes (IPC) en C01F5/02

3. De la solicitud de Patente

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intervalo puntual para cada una de las características técnicas, no siendo estas precisas ni claras, ya que no permiten una comparación con el estado de la técnica.

En conclusión, el capítulo reivindicatorio no cumpliría con el requisito de claridad de acuerdo con el artículo 30 de la Decisión 486.

4. Determinación del Estado de la Técnica

Considerando que la fecha de presentación de la primera solicitud de patente de la cual se reivindica prioridad es: 1 de febrero de 2005, se buscaron documentos del estado de la técnica relacionados, con fecha de publicación anterior a esta.

Nº	Documento	Título	Fecha de publicación
D1	US3085858	RECOVERY OF MAGNESIUM COMPOUNDS FROM ORES	1963-04-16
D2	US4474737	PROCESS OF PURIFICATION OF MAGNESIC RAW MATERIAL	1984-10-02

D1 describe un proceso para la extracción de magnesio de una fuente mineral que contiene calcio y magnesio el cual comprende la lixiviación del magnesio por el tratamiento del mismo con una solución saturada de dióxido de sulfuro y dióxido de sulfuro gaseoso manteniendo el pH en 4.5 a 5.5 para producir una solución de bisulfito de magnesio el cual contiene calcio el cual es disuelto. Luego se adiciona una sustancia del grupo del hidróxido de magnesio ó óxido de magnesio para la solución de bisulfito para obtener un precipitado de sulfito hexa-hidratado de magnesio. Luego el precipitado se calcina para obtener óxido de magnesio (Reiv. 1, 3 y 5).

D2 describe un proceso de purificación de material de desperdicio. El dióxido de sulfuro permite reaccionar con una suspensión acuosa de magnesio, hidróxido de magnesio, entre otras aun pH de 3 a 7.5 la mezcla de al reacción es separada en una fase sólida y al menos una fracción rica de $MgSO_3 \cdot xH_2O$ donde x se encuentra entre 3 o 6, y al menos una fracción que contiene impurezas (Resumen).

5. Análisis de patentabilidad (según requisito) (artículo 14 D486)

Novedad (artículo 16 D486)

Respecto a la reivindicación 1

La reivindicación 1 hace referencia a: "Proceso para la recuperación de óxido de magnesio a partir de una fuente que contiene sales de magnesio, incluyendo dicho proceso los pasos de:

- a) añadir un álcali y dióxido de azufre a la fuente que contiene sales de magnesio, en un paso de lixiviación para formar un bi-sulfito de magnesio conteniendo el lixiviado;
- b) separar los materiales insolubles del lixiviado;
- c) separar el dióxido de azufre en exceso del lixiviado y hacer precipitar el magnesio en forma de hidrato de sulfito de magnesio sólido;

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Análisis de las diferencias de la invención:

Características Esenciales de la reivindicación 1	D1 US3085858	D2 US4474737
Proceso para la recuperación de óxido de magnesio a partir de una fuente que contiene sales de magnesio	Si (Col 1 líneas 11-13)	Si (Resumen)
a) añadir un álcali y dióxido de azufre a la fuente que contiene sales de magnesio, en un paso de lixiviación para formar un bi-sulfito de magnesio conteniendo el lixiviado	Si (Col 1 líneas 18-20)	Si (Col 2 líneas 3-6)
b) separar los materiales insolubles del lixiviado; separar el dióxido de azufre en exceso del lixiviado y hacer precipitar el magnesio en forma de hidrato de sulfito de magnesio sólido	Si (Col 1 líneas 35-35, Col 2 líneas 19-22, 27-29)	Si (Col 2 líneas 20-28)
c) separar el hidrato de sulfito de magnesio sólido del lixiviado al cual se le ha extraído el magnesio	Si (Col 2 líneas 35-36, Reiv. 3)	Si (Col 2 líneas 28-31)
d) calcinar el hidrato de sulfito de magnesio sólido y recuperar el magnesio en forma de óxido de magnesio	Si (Col 2 líneas 38-40, Reiv. 5)	Si (Col 3 líneas 32-34)

De acuerdo con el cuadro anterior donde se comparan las características técnicas de la reivindicación 1 con las anterioridades D1 y D2, se concluye que el proceso para la recuperación de óxido de magnesio a partir de una fuente que contiene sales de magnesio descrito en la reivindicación 1, ya era conocido en el estado de la técnica como se evidencia con las anterioridades encontradas. Por lo tanto la reivindicación 1 y sus dependientes no pueden considerarse nuevas.

6. Conclusión

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

Nº	Documento Nº	Reivindicaciones afectadas	Requisito que afecta
D1	US3085858	1-31	Novedad
D2	US4474737	1-31	Novedad

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de 60 días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

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



JOSÉ LUIS SALAZAR LOPEZ
Director de Nuevas Creaciones (C)

El anterior requerimiento fue notificado por fijación en lista, de fecha
11 MAR. 2011