

**INTERNATIONAL COMMITTEE FOR STUDY OF
BAUXITE, ALUMINA AND ALUMINIUM
ICSOBA
NEWSLETTER**



A biannual publication

Volume 14 – June 2014

CONTENTS

CONTENTS	2
FOREWORD	3
NEWS AND EVENTS	4
TECHNICAL PAPERS	7
Calcination – the Decisive Step for the Alumina Quality.....	7
ICSoba MATTERS	17
Board of Directors and Council.....	17
Internal organisation.....	21
Public relations and Communication.....	22

The picture on the front page shows the Opening Ceremony of the ICSoba-2010 conference in Zhengzhou.

In case you consider publishing in this forum, please contact the editor before writing your article.

Deadlines for a June issue is 10th of June and for a December issue 10th of December.

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Corporations Canada, Ontario under number 802906-7, and
Registraire des entreprises, Quebec under number 1167982181.

FOREWORD



Dear ICSOPA Members,

As you certainly all recall, ICSOPA celebrated its 50th anniversary in Krasnoyarsk, Russia last year. Those of you who had a chance to attend the conference felt fortunate, honored, and excited to participate in this historic event. A lot has happened in these 50 years - ICSOPA has organized 31 (thirty-one) conferences in fifteen (15) countries, on four different continents with thousands of participants from all parts of the world. China will mark the beginning of the second half century for ICSOPA. There is no doubt that the coming period will be rich in accomplishments and equally rewarding for our organization. We its members can look with optimism to the future. ICSOPA is global and its activities span across continents thereby providing a forum for both international and local players to connect, the benefits of which are numerous.

The importance of ICSOPA in your professional life is clear. The ICSOPA forum provides a network of like-minded professionals at various levels of seniority within their respective organizations. The forum can clearly help you to further your career – from allowing you to enlarge the horizons and exchange experience and thus broadening your current set of skills, to enhance your networking, to advance from your current position, and perhaps to find a new job. Note that your ICSOPA member benefits also include free access to countless articles documented in TRAVAUX volumes from more than 30 conferences. Young professionals (i.e. under the age of 30) can also apply for travel subsidies and receive prizes such as “best paper reward” at our conferences.

ICSOPA is global and its activities span various countries thereby opening its forum to local and very often new players. Such combination enriches

the society and active professionals and is a guarantee of ICSOPA future. ICSOPA is an international association of members and ICSOPA belongs to its members. Since the members periodically elect the Board of Directors and Council in the Annual Meeting, the members determine the policy and success of ICSOPA. ICSOPA has given so much for many of us. As successful professionals we are highly privileged. But with great privilege comes great responsibility that we have toward the society. At least I see it that way. The least we can do is give back by supporting the present work of ICSOPA so that the future generations can benefit as we did. We, as established professionals, have been fortunate to carry the torch for a number of years. At some point, however, we need to make sure that we have new hands to pass the torch to so it can be carried into the future. The most important responsibility that we all have is to assure ICSOPA continuity.

During the 32nd ICSOPA conference to be held in Zhengzhou, China an election for the board of directors will take place. It will be time again to renew the ICSOPA board and elect new directors. ICSOPA is seeking individuals strongly identified with the aluminum industry who are interested in leading the organization and who would be committed to maintaining its credibility and accountability on the international scale. Expected qualities include strength of character, vision and leadership skills. The renewed board would be expected to forge a strong bond and trust with present members and push ICSOPA’s legacy to the next level. A good turn-out from the members will guarantee the fairness and credibility of the election. More information on the upcoming election you will find in ICSOPA MATTERS.

As always, the 2014 ICSOPA conference objective is to bring international and Chinese colleagues together to connect, to share results of their work from practice and research, and to explore potential collaborations. ICSOPA fosters a culture of inclusive international collaboration for the bauxite, alumina and aluminum professionals and it should continue. See you in great numbers in Zhengzhou in October!

Frank R. Feret
President, ICSOPA

NEWS AND EVENTS

International Committee for Study of Bauxite, Alumina & Aluminium
ICSoba-2014 **32nd International Conference & Exhibition**



**with smelter or refinery
plant visit on Oct 15**

Liaozuo Wanfang smelter



Zhongzhou refinery



**New Challenges of Bauxite, Alumina & Aluminium
Industry and Focus on China**
13- 14 Oct parallel speaker programs for bauxite,
alumina and aluminium, incl. carbon & casting

**Workshop on Oct 12 about the theory and
practice of aluminium production,
at no additional charge**



12-15 October - hosted by CHALCO's Zhengzhou Research Institute
www.icsoba.info/icsoba-2014 info@icsoba.info

Candidates for the Board of directors or Council step forward!**Elections at the Annual meeting of ICSoba members during the ICSoba-2014 conference in Zhengzhou**

In December 2011 ICSoba moved its seat from India to Canada where it was formally registered. The Canadian Bylaws¹ relate to the general conduct of the affairs of ICSoba as a not-for-profit association of members and elaborate on the roles of:

1. Members including conditions for membership, (voting) rights and annual meeting of members
2. Board of directors & officers including their meetings, term, duties and election (for directors) or appointment (for officers)
3. Council including the appointment of Council members, their duties and meetings.

During each ICSoba international Event formal meetings are held. In the Council meeting, council members are consulted by the Board on the policy and execution of affairs and Council inputs are included in the proposal of the Board. In the General members' meeting the Board presents the annual

¹ A copy of the adopted bylaws can be downloaded from the ICSoba web site.

report and financial account², proposes new policies or regulations, future events and new Council members. ICSOBA members can endorse, amend or reject the proposals of the Board, and elect new directors of the Board if applicable.

In the annual meeting of the ICSOBA-2012 in Belém (Brazil) members elected the present 5 directors of the Board for a 2 years' term, hence there will be elections again in 2014. Candidates are requested to step forward. For enquiries as to what it involves and how to qualify please contact Mr. Frank Feret or any of the other directors.

Also the Council is open for additional members in order to improve the representation by region and domain. Eligibility for the Council requires to be ICSOBA member for as least one year and for the Board to be ICSOBA member for at least two years. It should be noted that membership was automatically included in the conference registration of the 2012 and 2013 ICSOBA conferences. Names and email addresses of current Board and Council members can be found on the ICSOBA website under the *About us* section.

You can make a difference for the future of ICSOBA and enhance your own professional profile at the same moment.

² A copy of the latest annual account of ICSOBA's public accountant can be downloaded from the ICSOBA web site.

BAUXITE RESIDUE VALORISATION AND BEST PRACTICES CONFERENCE

Leuven 5-7 October 2015

We are very happy to announce the Bauxite Residue Valorisation and Best Practices conference that will take place in Leuven, on 5-7 October 2015.

The conference aspires to cover the whole chain of bauxite residue from production to applications and demonstrate that bauxite residue is a resource.

Conference topics

The following topics will be covered:

- ↪ From bauxite to a modified bauxite residue
- ↪ Neutralisation, re-vegetation and beyond
- ↪ Recovery of major (Fe, Al, Ti), minor and rare earth elements
- ↪ Cement, concrete, ceramics and inorganic polymers
- ↪ Other novel applications

Scientific Programme

- ↪ Each session will be opened by keynote lectures given by specialists and high level representatives from both academia and industry.
- ↪ Oral presentations will follow where participants will present their work. Poster presentations will also have the option to present the main findings orally.
- ↪ The conference will close with an open discussion on the important findings, messages-to-take-home and further actions.
- ↪ The revenues from the conference will become an award, compensating travelling, accommodation and working costs for a researcher to come and spend time in KU Leuven, giving access to top-notch facilities



5-7
2015
OCTOBER



<http://conference2015.redmud.org/>

Save the date

- ↪ Abstract submission deadline:
28th February 2015
- ↪ Notification of acceptance:
1st April 2015
- ↪ Full paper submission deadline:
30th June 2015
- ↪ Final program:
1st September 2015

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ICSOBA

TECHNICAL PAPERS

Calcination – the Decisive Step for the Alumina Quality

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Abstract

In the production of Metallurgical Grade Alumina (MGA) the calcination step determines many of the key properties and quality parameters of the product alumina. The quality of MGA has far reaching consequences in the aluminium smelter, where the material is used as a scrubbing medium and for the electrolytic production of aluminium metal. For example, the porosity of the alumina influences the ability to capture the HF that is emitted in the smelting process. Residual hydroxyls or gibbsite on the other hand increases the generation of HF in the cells. Additionally, the handling and dustiness as well as the dissolution characteristics are influenced by properties determined largely in the calcination step. In the smelter a uniform product quality is perhaps the most desired quality criteria. In addition, low LOI and low alpha alumina content as well as a high surface area are viewed as important performance indicators. How the calcination step is carried out, and particularly the calciner technology applied, is key to achieving an alumina quality that meets today's quality demands.

Keywords: Alumina Quality, Calcination, HF Emissions

1. Introduction

1.1. Calcination and Alumina Quality

As can be seen from the table below (modified from [1]), several of the key properties and quality parameters for effective utilisation of the MGA in the aluminium smelter are directly influenced by the calcination process. The calcination strategy is governed first and foremost by the need to meet a specification for a specific surface area while maintaining a low residual hydroxyl content (measured as LOI). Keeping the LOI value low is necessary to limit HF generated when the alumina is fed into the molten electrolyte in the reduction cell, whereas a high surface area is important for effective performance as a gas scrubbing medium. Alpha alumina content is dictated by the temperature and residence time in the calcination and has an influence on the dissolution behavior of the material.

Table 1. Typical MGA properties and operations influencing the development of specific properties (modified from [1]).

Item	Major Impact	Minor Impact	Normal Range
Particle Size	Precipitation	Calcination	10 - 200 μm
Chemical Composition		-	-
- Na_2O	Precipitation	Calcination	0.3 - 0.7 wt-%
- Fe_2O_3	Digestion	Clarification, Calcination	0.01 - 0.04 wt-%
- SiO_2	Digestion	Calcination	0.01 - 0.03 wt-%
- CaO and other	Digestion, Clarification	-	-
Surface Area	Calcination	-	60 - 100 $\text{m}^2 \text{g}^{-1}$
Alpha Alumina	Calcination	-	2 - 20 wt-%
MOI (up to 300°C)	Calcination	-	1.5 - 4.0 wt-%
LOI (300 to 1000°C)	Calcination	-	0.3 - 1.5 wt-%
Attrition Index	Precipitation, Calcination	-	4-15
Crystallite Size	Precipitation	-	10 - 200 μm
Density (bulk, loose)	Precipitation, Calcination		880 - 1100 g cm^{-3}
Angle of Repose	Precipitation	Calcination	30 - 45°
Particle Breakage	Precipitation, Calcination		
- Attrition Index			5-30

As demonstrated by numerous authors, the temperature history, particle size and morphology, crystallinity, impurities and atmospheric conditions impact on the transformation reactions and thus also the development of properties [2, 3]. The relationship between calcination conditions and specific properties is fairly well established under well controlled laboratory conditions and using model compounds, but the different nature and conditions in modern stationary calciners present a challenge in understanding how properties develop throughout the process. Also, the understanding of the influence of precursor material properties (such as impurities and impurity distribution, particle morphology, etc.) on the calcination reactions and the development of microstructure and properties is lacking [4].

1.2. Calciner Technologies

Two main technologies of alumina calcination are used in the industry; 1) rotary kiln or, 2) stationary calciners. Of the stationary calcination technologies there are two main variations in use: the Circulating Fluid Bed (CFB) and the Gas Suspension / Fluid Flash (GSC). As is discussed in detail below, the main difference between the CFB and the GSC calcination technologies is in the gas/solids velocities and residence times.

1.2.1. Rotary Kiln Calcination

A schematic illustration of a Rotary Kiln, with improved heat recovery by hydrate pre-heating, can be found in figure 1. In rotary kiln calcination operations, gibbsite enters the kiln at the cold end and passes along the kiln countercurrent (by gravitation aided by continuous rotation of the kiln) to a stream of hot combustion gases generated by gas or oil burners in the 'hot end' of the calciner. The kilns are refractory lined and sit on an angle (typically a few degrees downward slope towards the hot end) to aid with the materials flow. Control of the calciners is typically through a direct temperature measurement at the hot end and indirectly by monitoring flue gas oxygen and CO contents [5]. Control is challenging due to the lack of direct process measurements (the product quality analysis takes several hours to conduct), the large thermal mass (particularly a problem for start-up and shut-down) and the complex residence time distribution (sometimes furnace chokes are used to increase the overall residence time) [6]. In addition, the product quality is very inhomogeneous, due to both the non-uniform temperature distribution (both in the radial and longitudinal directions) as well as the non uniform residence time distribution.

Over the years several attempts to increase the energy efficiency have been made, including: longer kilns, pre-dryers, coolers/heat exchangers and improved process control [1, 5, 7]. Despite the technological developments and significant improvements in kiln control the energy efficiency still falls short of the superior energy efficiency of the modern stationary calciners. Lowest typical energy consumption figures ranging from 3.2-3.4 kJ/kg have been quoted [7]. Rotary kilns are being superseded by the more energy efficient stationary calciner technologies.

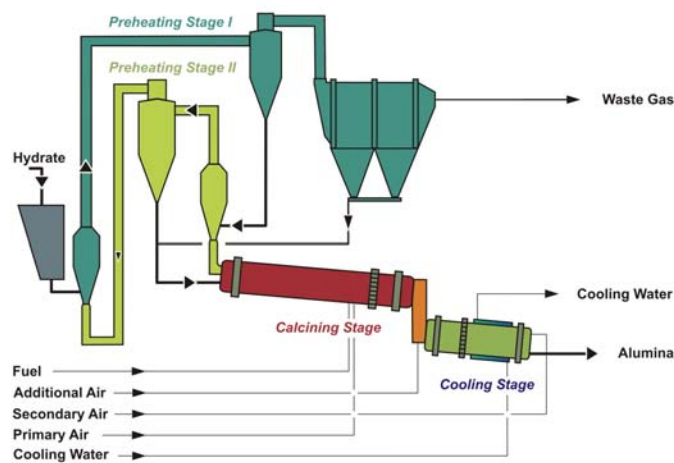


Figure 1. Schematic illustration of a Rotary Kiln calciner with heat recovery in the pre-heating stage

1.2.2. Stationary Calciners

Today there are two stationary calcination technologies existing: Circulating Fluid Bed (CFB) and Gas Suspension / Fluid Flash (GSC). The main difference between the Circulating Fluidised Bed and the Gas Suspension/Fluid Flash calcination technologies is in the gas/solids velocities and residence times. As can be seen from figure 2, depending on the gas velocity the fluid bed reactors are classified into different types. Fluid bed reactors operating at relatively low gas velocities represent the 'classic' Bubbling Fluidised Bed. These operate as a continuously stirred tank reactor with defined solids residence time distributions.

With higher gas velocities the slip velocity (the differences between gas and solids velocities) increases and the fluidisation behaviour changes accordingly. At these velocities the gas has enough energy to entrain the solids, which are then separated from the gas in a cyclone and returned to the fluidised bed reactor. The use of a recirculation cyclone and the internal recirculation in the main reactor (or furnace in alumina CFB calciners) results in a homogenous temperature distribution and an extended retention time. With even higher gas velocities the solids velocity will approach the velocity of the gas; this represents the flash reactor (or Gas Suspension or Fluid Flash calciners in Bayer operations). In the flash reactor the temperature distribution is more heterogeneous (than in CFBs) and the gas/solids retention time is shorter.

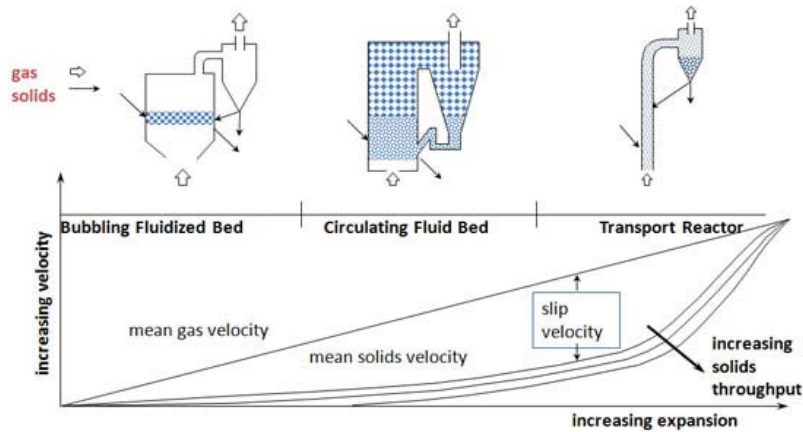


Figure 2. Different types gas/solid reactors for fine particulate solids and relative (or slip) velocities (reproduced from [8]).

Gas Suspension Calcination

The most modern design implementation of the Gas Suspension calciners (also known as Fluid Flash calciners) has four main process stages [9], these being:

- Drying and pre-heating/pre-calcination (PO1/PO2)
- Calcination furnace (PO4), furnace cyclone (PO3)
- Direct heat recovery (by direct air cooling, CO1-CO4)
- Indirect heat recovery (by water cooling in a fluidised bed cooler, FBC)

as outlined schematically in figure 3. (reproduced from [9]).

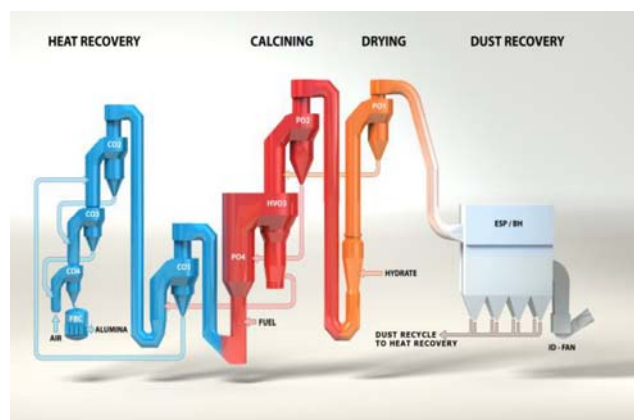


Figure 3. Process diagram of a Gas suspension calciner (reproduced from [9])

In this process, all gibbsite is carried by the combustion gases (originating from the calcination furnace) and transported to the first preheating stage (PO1) where the solids are separated from the gases in a cyclone. The solids continue on to the second pre-heating stage, in which the off-gas from the furnace is used to further pre-heat the material. From there the solids continue to the calciner furnace (PO4). In contrast to the Circulating Fluid Bed process the solid material is carried through the furnace in one pass only, and then separated from the gas in the furnace cyclone (PO3). At high capacities the GSC technology reaches its limit, due to the non-ideal gas-solids mixing for large vessel diameters. To achieve complete calcination and avoid gibbsite in the product, a holding vessel is sometimes used to increase the retention time and ensure that the reactions have time to proceed to a desired degree in order to meet product specifications.

The addition of a holding vessel allows for significant energy savings as the temperature in the furnace may be reduced and the reaction time is prolonged in this process stage [9]. Additional energy savings are made possible through heating of the combustion air. The combustion air is heated by counter current heat exchange in the 4-stage cyclone coolers (CO1-CO4). A final, indirect, cooling and heat exchange is carried out in a water cooled fluid bed cooler (FBC). An energy consumption of 2.8 kJ/kg alumina (LHV) has been reported [9].

Circulating Fluidised Bed

The main components of the Circulating Fluidised Bed calcination process are: preheating stages, a calcining stage and two cooling stages. The entire residence time from when the raw material is fed into the process to the point when the product is discharged from the end is roughly twenty minutes. CFB calciners typically operate in a range from 900 to 1000°C, depending on product quality demands. A schematic illustration of the process is included in figure 4.

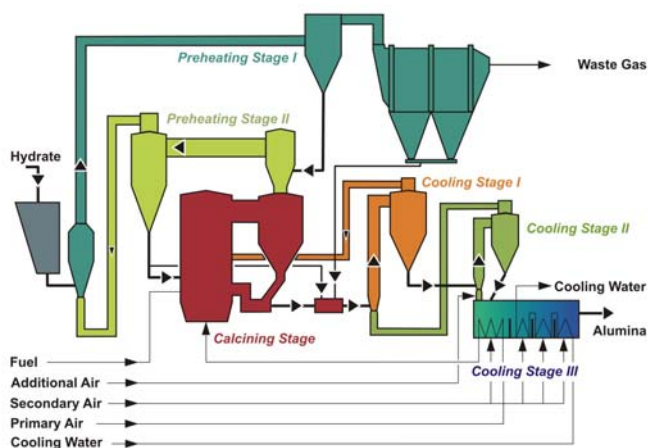


Figure 4. Schematic diagram of a Circulating Fluidised Bed calciner

The CFB calciner makes use of a multi-stage venturi preheating system to recover the waste gas heat by preheating and drying the gibbsite feed prior to reaction. The main calcination reaction is carried out in the CFB reactor. The energy for the calcination process is supplied by direct combustion of either oil or gas. Energy in the hot alumina is also recovered in a multistage cooling system (which includes several cyclones and a fluidised bed alumina cooler). In a further design evolution of the CFB technology some of the energy in the hot alumina can also be used to directly react part of the gibbsite from the first preheating stage (in a so-called "hydrate bypass"). The CFB technology can be scaled up without consequences for product quality owing to the recirculation of solids in the CFB which results in an even temperature distribution and homogenous product quality also at large capacities. Recent experience, with large calciner, has shown that the calciner design has a large influence on the product quality (e.g. particle breakage). Continuous industrial operation with the hydrate bypass demonstrates that no detrimental impacts on product quality are observed (in particular, no traces of gibbsite detected in the product) [10].

The efficient use of heat exchange technology and the implementation of the “hydrate by-pass” and the inclusion of a hydrate dryer (which uses heat from the FB-cooler) brings the total energy consumption down to a world record low 2.7 kJ per kg of alumina (LHV) produced [10].

2. Development of Alumina Quality in Calcination and Alumina Performance

2.1. Microstructure, Porosity and Specific Surface Area and Resulting Dry-scrubber Performance

Alumina microstructure is significantly influenced by calciner technology and operations and has a range of impacts on the performance of the material in the aluminium smelter. The development of structural features during the calcination of Bayer gibbsite to produce Metallurgical Grade Alumina (MGA) is a complex process that involves both a dehydroxylation reaction and a rearrangement of the crystal lattice. The highly agglomerated starting material, the pseudomorphic nature of the reactions and the incomplete transformation to the thermodynamically stable alpha alumina, give rise to a mixed phase meso- to macro porous material [4]

During the calcination of Bayer gibbsite the porosity grows very rapidly during the initial reaction stages, a sample calcined for 2 seconds already exhibits a porosity of $175 \text{ m}^2 \text{ g}^{-1}$ and has an average pore size in the sub 1 nm range (see figure 5). The large porosity is a result of the fine pore size during the early stages of the dehydroxylation reactions. Further heating leads to an expansion of the pore size which is naturally accompanied by a reduction of the specific surface area.

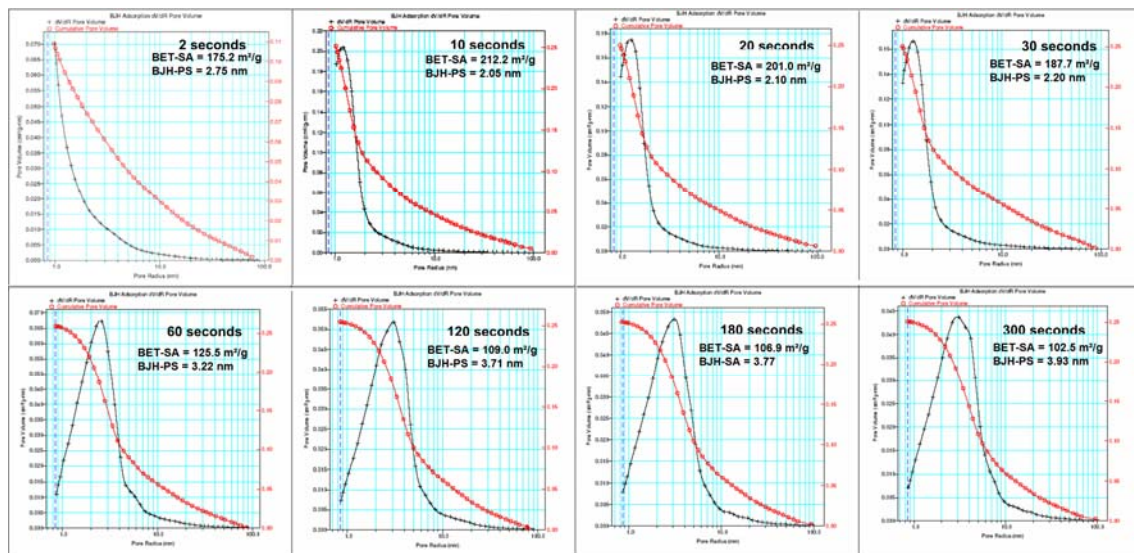


Figure 5. Development of pore size during gibbsite calcination. Samples calcined for the indicated times (2-300 sec) at 970°C . The x-axis displays pore size, in nm (note the use of a log scale), and the y-axis the pore volume, in m^3/g .

Figure 6 displays HF measurements (GTC inlet and outlet levels) when two alumina, aluminas C and D, were used. The higher inlet GTC HF concentration when alumina D was used may be attributed to the slightly higher gibbsite content measured for this alumina. However, the gibbsite content alone cannot explain the significantly poorer performance of alumina D in terms of HF removal in the dry scrubber [11].

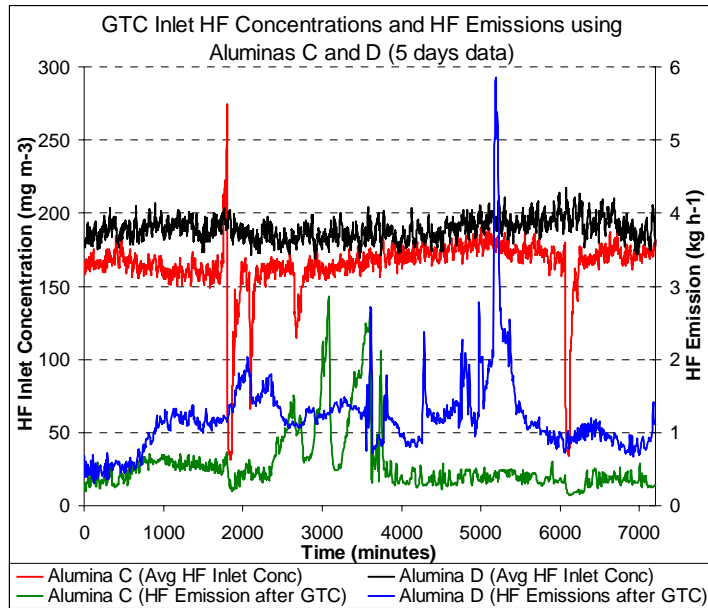


Figure 6. Dry scrubber (GTC) inlet HF concentrations and corresponding HF emissions when using aluminas C and D (5 days data).

To understand the performance of these aluminas the porosity and microstructure needs to be evaluated. A direct relationship between specific surface area and HF adsorption capacity has been reported [12]. High specific surface area is often considered advantageous in terms of optimal dry scrubber performance, and can often be the only way to deal with increased fluoride emissions. There is also a relationship between surface area and residual hydroxyl content. The residual hydroxyls are retained in the crystal lattice of the transition alumina phases due to incomplete calcination of gibbsite. In other words, higher surface area stems from more of the low order transition aluminas (gamma, chi, rho alumina) which also have more residual hydroxyls retained in the lattice and hence also have a higher HF generation potential.

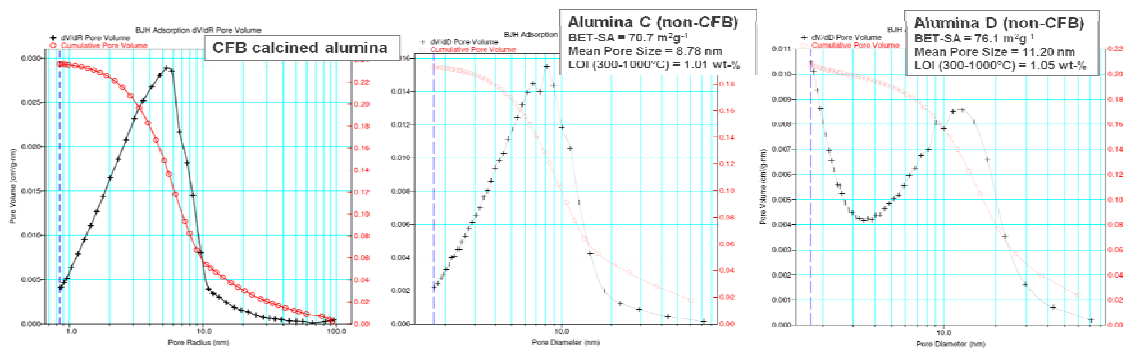


Figure 7. Pore size distribution plots for a CFB-calcined alumina (left) compared with aluminas C and alumina D. Note that both aluminas C and D are non-CFB calcined aluminas.

Surprisingly, alumina D has a slightly higher surface area than alumina C (76.1 and 70.7 m²/g, respectively) which could be assumed to improve the dry-scrubbing efficiency and offset some of the additional HF formed due to the gibbsite present. However, the pore size distribution plots (figure 7) reveal a bimodal pore size distribution with one peak centred below 1.0 nm, and the other centred at a much larger pore size above 10 nm. This would indicate that alumina D contains a large quantity of under-calcined material and that the rest of the sample is over-calcined (rich in theta and alpha alumina). As the small pores also contribute to the total (or average) surface area alumina D therefore has a larger nitrogen specific surface area. However, the fine pore size

may actually not be optimal for HF removal. The narrow pores may become blocked when HF reacts to form oxy-fluorides thus restricting access to the internal porosity. The results demonstrate the importance of calciner technology in achieving a homogenous and uniform product quality.

2.2. Alumina Phases, Particle Breakage and Phase Distribution

Alumina phase transformation pathways during thermal treatment of gibbsite have been studied extensively and several excellent reviews exist [2]. The reactions have been found to be influenced by several parameters (such as temperature, heating rate, residence time, particle size and morphology, crystallinity, impurities and atmospheric conditions) some of which are directly related to Bayer operations [2, 13, 14, 15]. Apart from the initial decomposition to chi alumina, rho alumina or boehmite, the reactions proceed slowly; and prolonged heating is required to reach equilibrium for any of the meta-stable transition alumina forms. Rietveld refinements of several MGAs have revealed that this material is better represented by a broad distribution, or continuum, of phases, along the gamma to alpha pathway [4].

Despite the best efforts in design and operation, some fines are unavoidably generated also in the calcination process. This particle breakage is influenced by both the calciner technology and the strength of the original gibbsite [16]. Agglomerates break up into smaller fragments due to mechanical forces or thermal shock when contacting hot gases or solids. Furthermore, during the phase transformation of the gibbsite into alumina, the crystallites shrink (largely along the c-axis direction in the gibbsite lattice) which can cause further mechanical stress in the particles and fragmentation. The alumina particles will also break up due to mechanical forces from collisions between the particles themselves or between particles and other surfaces.

More important than the amount of fines generated in the process is the nature of the fine particles [17]. Fine particles tend to behave differently in the various process stages in calcination (cyclones for example), and depending on calciner technology they may therefore have different properties than the bulk material. Depending on process design and operation the fines may for example be subject to internal recirculation or blow-by which influences the alumina phase composition of the fines as the residence time is different for these particles. The ESP dust treatment strategy therefore becomes critical for maintaining product quality.

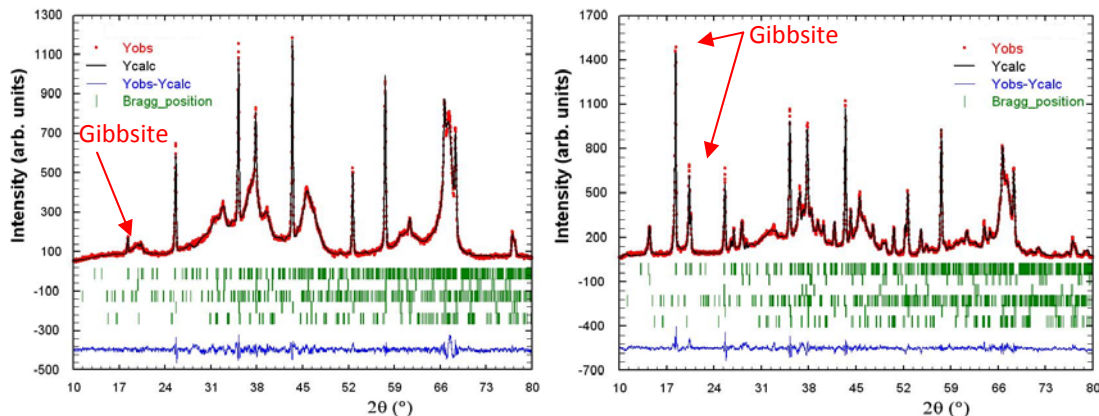


Figure 8. Rietveld refinement of a bulk (left) and <45 μm size fraction (right) non-CFB calcined MGA sample. Characteristic peaks for gibbsite indicated in the figures.

In the example above (figure 8), Rietveld refinement was used to study the alumina phase composition of a size fractionated MGA sample. Even by qualitative assessment of the XRD spectra, it is obvious that the phase composition is very different for the two samples. Rietveld refinement allows quantifying the alumina phases as well as the gibbsite content [4]. In the example above, the fines contained 22.0 wt-% gibbsite, compared to only 1.2 wt-% gibbsite for the bulk sample. It goes without saying that the performance expectations in the smelter

would be very different for the fine particles compared to the bulk. In smelters which are prone to alumina segregation effects in the transport and conveying systems, these problems can become even more pronounced.

2.3. LOI and MOI as a Measurement of Residual Gibbsite and OH and Resulting HF Formation

Due to the incomplete conversion to the thermodynamically stable alpha alumina some residual hydroxyls (OH) will remain in the transition alumina structures present in MGA. This is reflected by the LOI (Loss on Ignition) measurement, a standard method which measures the weight loss between 300-1000°C. Together with other OH sources (such as gibbsite) this represent the main source of HF formation in the electrolyte [18]. In the cell HF is formed in the electrolytic process when a hydrogen source (such as OH) reacts with the electrolyte (NaAlF₃). Gibbsite however reacts below 300°C and although a potent HF formation source is thus not captured by the LOI measurement. Additionally, gibbsite has been linked to other process problems such as “volcano effects” which contribute to the dustiness [17]. There is a growing consensus that the LOI measurement is inadequate in predicting the HF formation potential and that a broadening or redefinition of how the LOI is measured is needed.

Meyer et al. conducted a study examining the process changes at the smelter during changeover of alumina shipment [18]. The authors concluded that that less fluoride was brought back to the pots with an alumina displaying a bi-modal pore size distribution indicating a lower adsorption capacity (or slower adsorption kinetics due to restricted access to the internal surface area). The research also supports the observation that gibbsite plays an important role for bath chemistry and potroom operation, particularly in terms of generation of HF. As a result of their studies, the implementation of additional characterization methods was initiated to better follow up alumina shipments.

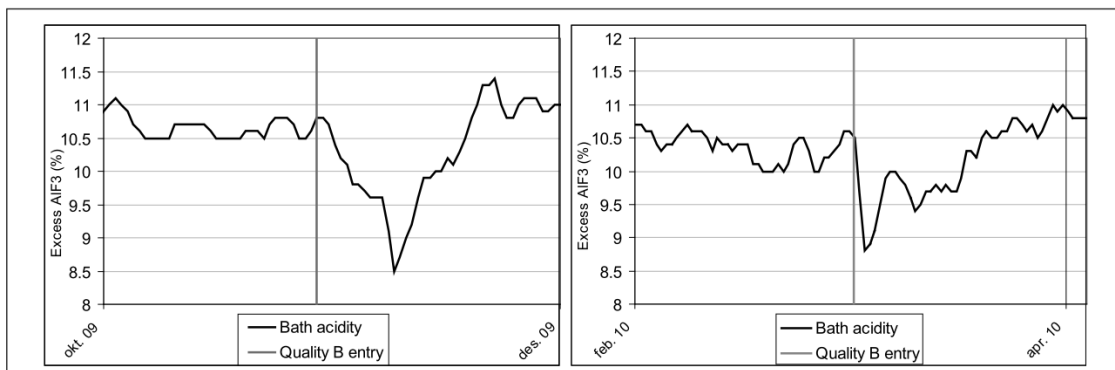


Figure 9. Drop in bath acidity when changing alumina quality, due to the presence of gibbsite and possibly also limitation in HF adsorption (reproduced from [18]).

3. Conclusions

There is a mounting amount of published smelter data indicating the importance of and need for complementary information to define alumina quality. The alumina specification sheet offers only a limited picture of the alumina quality, particularly when it comes to predicting HF generation capacity or dry-scrubber performance. The BET surface area is an average measurement, and does not necessarily reflect the HF adsorption capacity as the pore size distribution seems to be linked to the adsorption mechanisms. Pore size distribution plots can reveal if the aluminas contain under calcined components (low order transition aluminas or boehmite) with finer pore sizes. TGA or XRD can be used to quantify the gibbsite content, which is critical for understanding and predicting the HF generation potential.

Calcliner technology and operation play a key role for the alumina product quality; in part this is related to the generation of, and capability to handle fines in calcination. However, for alumina performance, the nature of the fines is more decisive than the quantity of fines. The treatment of the Electrostatic Precipitator (ESP) dust has particular consequences also for the bulk properties (such as average surface area or pore size).

4. Acknowledgements

The support from the Light Metals Research Centre (Auckland, New Zealand) and Aluminium Delfzijl B.V. (Farmsum, The Netherlands) in collecting and analyzing data is gratefully acknowledged. In particular, Prof. Jim Metson and Dr. Marco Stam are recognized for their contributions.

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ICSOBA MATTERS

Spurred by the popularity of ICSOBA previous workshop held in Krasnoyarsk last year, also this year a technical workshop will take place on Sunday, October 12, prior to the main conference in Zhengzhou. The workshop entitled “Aluminum Electrolysis” will be led by Dr Marc Dupuis of Quebec, Canada. Marc is a world renowned expert in the electrolysis field and has numerous scientific contributions to his credit. Some of Marc’s selected presentations can be consulted on his website <http://www.genisim.com/download/pdf.htm>.

On Monday 13 October the main conference will begin with keynote presentations. Among the confirmed speakers who form a very attractive group there are:

Dr Liu Wei - President of Zhengzhou Research Institute - CHALCO (Aluminium Corporation of China Limited), China

Dr Li Wangxing - Chief Technical Officer of CHALCO, China

Mr Wen Xianjun - Vice president of China Nonferrous Metals Industry Association, China

Mr Lv Dingxiong - President of Northeastern University Engineering & Research Institute Co., Ltd (NEUI), China

Prof. Li Jie - President Assistant of Central South University, China

Mr Alexandre Gomes - Technical Director, Votorantim Metais

Dr Ali Al Zarouni - Vice-president Smelter Operations, EGA, United Arab Emirates

Mr Ron Knapp - President, IAI, Great Britain.

Details related to the technical program can be found on ICSOBA website www.ICSOBA.info and they are updated on the regular basis. Please do your best to attend.

Board of Directors and Council

Four founding members of ICSOBA in Canada: Marja Brouwer, Frank Feret, Andrey Panov and Jeannette See form the Board of Directors. They bear moral and ethical responsibility to assure continuity of ICSOBA. The executive body called Board of Officers is composed of six individuals with responsibilities as follows:

Dr Frank Feret	president
Dr Li Wangxing	vice president
Dr Andrey Panov	vice president
Dr Jeannette See	secretary general
Ms Marja Brouwer	internal and external affairs
Mr Leslie Leibenguth	executive treasurer

The mandate of this group will expire at the end of present term of two years.

Although ICSOBA official seat is now in Canada, Dipa Chaudhuri continues to work for ICSOBA in India and is ICSOBA's contact person to the outside world (Dipa@icsoba.org).

György (George) Bánvölgyi is the editor for ICSOBA's Newsletter.

Training of Ms Dipa Chaudri, Assistant Executive

At the Krasnoyarsk Conference, the ICSOBA Board of Directors decided to expand the duties of Ms Dipa Chaudhuri, ICSOBA's Assistant Executive, to include bookkeeping and assist Mr Leslie Leibenguth in fulfilling his office as new Treasurer of ICSOBA. To this effect she was invited by Ms Marja Brouwer, the former treasurer, to come to The Netherlands for a two week's training program in March 2014.

The program included the creation of a new accounting system in 'Quickbook', the use of advanced Excel features for administrative purposes and of design software to create promotional artwork. Also the ICSOBA Archives was structured and stored in such a way that files can be made accessible to other ICSOBA Officers.



In addition Mr Roelof den Hond, past President ICSOBA, introduced Dipa to the fundamentals of bauxite, alumina and aluminium production.

The ICSOBA Council: *moving it forward!*

ICSOBA boasts of a Council which serves as an advisory group to the Board of Officers. Currently composed of a Chair and 27 active members, this group provides invaluable strategic advice and complementary skills while contributing to the activities of the organization through creative dialogues, bringing in fresh ideas and innovations.

Additional details regarding the appointment of the Council Members and the modus operandi of the Council can be found in the ICSOBA By-Laws, available on the ICSOBA website.

Council members jointly represent the following areas:

- a. Technical: bauxite, alumina, aluminium, fabrication, environment, etc.
- b. Scientific: academies of sciences, universities, research and technological institutions, etc.;
- c. International societies: TMS, GDMB, AIM, EAA, etc.;
- d. Geographical distribution: Asia, Australia, Americas, Middle East, Europe, and Africa.

We are proud to present our current Council Members:

Prof. Arthur Pinto Chaves	Full Professor, Mineral Processing, São Paulo, Brazil	Dr. Viktor Buzunov	<i>ETC Krasnoyarsk UCRusal, Russia</i>
Dr. Yang Jianhong	Vice President of Zhengzhou Research Institute, CHALCO, China	Mr. Wagner Brancaloni	<i>Alumina Projects Hatch, Brazil</i>
Dr. Wanchao Liu	Research director at Zhengzhou Research Institute, CHALCO, China	Mr. Michel Reverdy	<i>Independent consultants, currently at Dubal</i>
Mr. George (György) Bánvölgyi	Technical Director, Bánvölgy Limited Partnership, Budapest, Hungary	Mr. Jeffrey Best	<i>Global Bauxite Manager, Hydro, Canada</i>
Ms. Rita Vaseur-Madhoeban	Director Bauxite Institute, Suriname	Dr. S. Sankaranarayanan	<i>VP R&D Hindalco Innovation Centre Belgaum, India</i>
Mr. Parris Lyew-Ayee	Executive Director, Jamaica Bauxite Institute	Ms. Suziany Rocha de Souza	<i>Project generation, Rio Tinto Exploration, Australia</i>
Mr. Ashish Jog	Project Manager Alumina, DUBAL, Dubai	Mr. André Pelland	<i>Refinery Technology, RTA, Canada</i>
Mr. Stef Sep	General Manager, Hencon Handling (PTY) Ltd., South Africa	Mr. François Crevier	<i>VP Mining and Metallurgy, SNC Lavalin, Canada</i>
Mr. Leslie Leibenguth	President LWL Technical Services, USA	Mr. Bernard Allais	<i>Director sales & marketing, RTA, France</i>
Mr. Fabio Araujo Mendes	Process development Manager, Paragominas Bauxite Mine, Norsk Hydro, Brazil	Dr Chitta Rajan Mishra	<i>Rtd R&D, National Aluminium Company NALCO, India</i>
Dr. Peter Smith	Principal Bayer Technologist, CSIRO, Australia	Dr Yin Zhonglin	<i>Director Alumina of Zhengzhou Research Institute, CHALCO, China</i>
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Internal organisation

The International Committee for Study of Bauxite, Alumina & Aluminium is an independent association that unites industry professionals representing major bauxite, alumina and aluminium producing companies, technology suppliers, researchers and consultants from around the world.

ICSOPA belongs to its members and since the members elect the Board of directors in the Annual Meeting during an ICSOPA Event, members determine the policy of ICSOPA. ICSOPA currently has 238 members.

Membership

ICSOPA provides members with a platform to exchange technical information with each other. Upon their request individual members who are consultants or advisors to the aluminium industry, will be enlisted on the designated Consultants page on the website.

Companies can support ICSOPA by becoming Corporate member. Corporate members are shown in every Newsletter and listed on ICSOPA's web site. Corporate members can nominate two employees who have the same rights as individual members, such as reduced event delegate registration fee, Newsletters and voting rights. Digital proceedings can be made available to all employees at the company's intranet, and corporate members can sponsor ICSOPA events at the reduced sponsor fee.

	INDIVIDUAL MEMBERS	CORPORATE MEMBERS
Reduced Sponsor rates at ICSOPA Events		Yes
Reduced delegate registration fee for ICSOPA Events	Yes	Yes for 2 nominated employees
Name listed in ICSOPA's website	In Consultants page upon request	In Corporate Members page with link to web site
Right to vote on ICSOPA matters and eligibility for Presidency and Council	Yes	Yes for 2 employees
Receive a digital copy of a full paper or full proceedings of a past ICSOPA Event	Upon request	Upon request
Biannual Newsletter with articles from members, news and statistics	Yes	Yes to 2 employees. Company mentioned in Newsletters
Annual fee (from July to July)	C\$ 100	C\$ 500

You can find an application form for individual membership and corporate membership on ICSOPA's website. You can also renew or apply for individual membership together with your registration for an ICSOPA event.

Public relations and Communication

Website

Printed proceedings of past ICSoba events, the so-called Travaux volumes, have been scanned to separate searchable pdf files. There are a few exceptions, these are being searched and scanned as soon as possible. The Tables of Contents of the scanned Travaux volumes have been made public on the website <http://www.icsoba.info/downloads/proceedings-of-past-events>. ICSoba members can obtain digital versions up to 20 papers each year at no cost by sending an email request to Dipa icsoba@icsoba.info. Additional papers are charged for C\$ 20 each.

Your feedback to make the website more attractive is welcome.

ICSoba's executive office



Not only requests for past proceedings, but all inquiries sent to ICSoba, whether by email to icsoba@icsoba.info or by phone to + 91 982 328 98 17, are addressed by Ms. Sudipta (Dipa) Chaudhuri in Nagpur, India.

Also mailings and the underlying database of ICSoba's contacts are taken care of by Ms Dipa Chaudhuri in the executive office.