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Oslo, 2015.05.27

Your ref.: U3206
Due date: **2015.08.27**
Application No.: 20140317 (**must be referred to in the response**)
Applicant: Nordic Mining ASA, Institutt for energiteknikk

Written opinion on patent application no. 20140317

Basis of opinion

Description: received 2014.03.12
Claims: received 2015.03.06
Figures: received 2014.03.12

Firstly we inform that the further processing of the present application has been undertaken by the undersigned examiner.

We have assessed the application in light of D1-D7 and arguments put forward by Patentstyret in statement of 2014.10.12 and the applicant in letter of 2015.03.06.

Like the above statement by Patentstyret we consider D1 the closest prior art in that D1 describes all the main process steps of claim 1.

The process according to claim 1 differs from D1 by describing the process steps in more detail. The differences vis-à-vis D1 are mainly related to:

- (1) Aluminiumchloride ($\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$) is precipitated by increasing the HCl concentration in the metal chloride solution.
- (2) The aluminiumchloride is calcined in two steps, first at 400-600 °C to generate HCl and thereafter at >600 °C to produce alumina.
- (3) Metal carbonate is precipitated by mixing the Al-lean metal chloride solution with an organic solution containing a selected amine and contacting the mixture with a CO_2 -containing gas, in order to extract HCl by formation of an ammonium chloride salt complex and to precipitate the metal carbonate.
- (4) Separating the metal carbonate, the remaining metal chlorides containing aqueous phase and the organic solution containing ammonium chloride and regenerating the amine.

The objective technical problem solved by the process of claim 1, in view of D1, can be regarded as providing a practical feasible implementation of the process.

In our opinion the features of section (1) and (2) above are close-lying for a skilled person in the art in that said steps are known per se in the technical field of the invention, ref. D3 (claim 1, (h)-(k); figure 1). As for section (1) it might be added that a similar sparging with

HCl to precipitate $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$ is known per se from the Anortal process described in D1, chapter 3.

On the other hand the features of section (3) and (4) are considered to represent innovative steps in the process according to claim 1.

In our opinion D5 and D7, when combined with D1, would not make the process of claim 1 obvious for a skilled person in the art. Firstly D5 and D7 are peripheral to the technical field of the invention and would not be obvious to take into consideration with regard to solving the technical problem posed. Secondly D5 relates to sodium bicarbonate contrary to calcium carbonate of the present process, though this is not expressed in claim 1 (see below). D7 does not describe use of amines in the process.

According to the above the process of claim 1 is considered to represent an innovative solution to the above technical problem, and fulfills the requirements of patentability, ref. Norwegian Patents Act, section 2, first paragraph.

This conclusion is with the reservation that claim 1 is delimited to some extent. Thus we consider precipitation of *calcium carbonate* as mandatory in the process of claim 1 which is not supported for any further in the description (see examples), ref. Norwegian Patents Act, section 8, second paragraph, third sentence; "patentretningslinjene, del C, kap. II, punkt 3.3.4, første avsnitt" (guidelines for examination).

You are requested to file a new revised set of claims which are drafted according to the above.

When a patent claim is amended, the applicant shall state where in the application as filed support for the amendment is found, ref. Patent Regulations, section 20. If an amended description is filed, the applicant shall specify which parts of the description are not in accordance with the previously filed description and specify in which way the amendments imply anything new in respect of the prior art, ref. Patent Regulations, section 21.

Sincerely yours,

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