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**Datasheet for the decision
of 17 July 2008**

Case Number: T 0543/06 - 3.3.05

Application Number: 00103669.8

Publication Number: 1127843

IPC: C01F 7/00

Language of the proceedings: EN

Title of invention:

Aluminium polychlorosulphates, process for their preparation
and use thereof

Applicant:

Pozzoli, Bernardo

Opponent:

-

Headword:

Aluminium polychlorosulphates/POZZOLI

Relevant legal provisions:

EPC Art. 123(2), 54(1)(2), 56
EPC R. 139

Relevant legal provisions (EPC 1973):

-

Keyword:

"Novelty (yes)"
"Inventive step (yes): improvement (yes) - non obvious
solution"

Decisions cited:

T 1067/97, T 0714/00

Catchword:

-



Case Number: T 0543/06 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 17 July 2008

Appellant:

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Decision under appeal:

**Decision of the Examining Division of the
European Patent Office posted 22 November 2005
refusing European application No. 00103669.8
pursuant to Article 97(1) EPC 1973.**

Composition of the Board:

Chairman: G. Rath
Members: H. Engl
S. Hoffmann

Summary of Facts and Submissions

I. This appeal lies from the decision of the examining division to refuse European patent application No. 00103669.8.

II. The examining division held that the subject matter of claim 1 lacked novelty having regard to document

D1: EP-A-0 744 378.

Subject matter claimed in the dependent claims was either also disclosed or deemed obvious having regard to D1.

III. An appeal was filed by letter dated 20 January 2006; the grounds of appeal were received by letter dated 31 March 2006 which also contained amended claims as a main request and auxiliary requests 1 to 3. The submission of the appellant was accompanied by five Annexes A1 to A5 containing experimental data on various aluminium polychlorosulphates and their performance in the treatment and clarification of water. The appellant also requested the reimbursement of the appeal fee on the ground of a substantial procedural violation in the proceedings before the first instance.

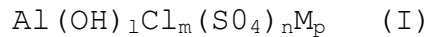
IV. In an annex to the summons for oral proceedings pursuant to Article 15(1) RPBA the board raised an objection under Article 123(2) EPC against the amended claims according to the second auxiliary request. The subject matter of the claims according to the main request and the first and second auxiliary requests was

considered to lack novelty and inventive step having regard to document D1.

V. In response to said communication of the board the appellant abandoned the main request and auxiliary requests 1 and 2 and made the third auxiliary request filed by letter dated 31 March 2006 his sole request. The request for reimbursement of the appeal fee was also withdrawn.

VI. The independent claims of said sole request read as follows:

"1. Aluminum polychlorosulphates having the general formula (I)



where

M represents an alkali metal,

l, m, n, p represent the number of moles per mole of aluminum, so that:

$$1.74 \leq l \leq 2.25,$$

$$0.065 \leq n \leq 0.17,$$

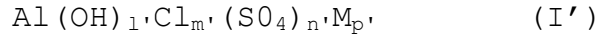
$$0.32 \leq p \leq 1.49, \text{ and}$$

$$l + m + 2n = p + 3,$$

and whose basicity, defined as $(l/3) \times 100$, ranges between 58% and 75%."

"3. A process for the production of the aluminum polychlorosulphates (I) as described in claims 1-2, comprising the following steps, carried out at room temperature:

(a) reaction of a basic compound of an alkali metal with aluminum polychloride or polychlorosulphate having the general formula (I')



where

$$1.1 \leq 1' \leq 1.44,$$

$$0 \leq n' \leq 0.10,$$

$$p' < p \text{ (p of formula (I))},$$

$$1' + m' + 2n' = p' + 3;$$

(b) reaction of the product obtained from step (a) with a compound that provides sulphate ions."

"11. Use of the compounds having formula (I) as described in claims 1-2 and mixtures thereof, as coagulation and/or flocculation agents."

VII. The arguments of the appellant may be summarised as follows:

The invention provided novel, highly stable aluminium polychlorosulphates having a basicity of between 58% and 75%, as defined in the claim, in combination with a high sulphate content. The polychlorosulphates according to claim 1 were novel because the overlap regarding the sulphate value n with the disclosure of D1 was removed. The content of sulphate, limited to $0.065 \leq n \leq 0.17$, fell outside the disclosure of D1. The products also did not show a signal at $\delta = -6$ ppm in the ^{27}Al NMR spectra (see Annex A3), in contrast to the products obtained in accordance with D1.

The new lower limit of 0.065 for the sulphates content was present in one of the examples in the original application documents. Moreover, it was clear from the Table on page 10 that the most efficient range of the values of the sulphate content was from 0.065 (disclosed in example 2) to 0.16 (example 4), which was the range now claimed. In contrast, the value of 0.01 of example 3 (now excluded from the claims) gave much worse results in terms of turbidity. It should be noted that a better result in terms of residual aluminium was less important than achieving a lower turbidity, because the level of residual Al could be greatly lowered simply by modifying the pH of the treated water to a point where Al has the lowest solubility. The turbidity could not be lowered in any way. It emerged from the experimental results presented in Annex 5 that the claimed aluminium polychlorosulphates exhibited lower turbidity in the treated water at all dosage levels, and therefore possess a higher coagulating power, thus yielding a better water quality. These advantageous results were due to the higher sulphate content of the novel products. Despite this high sulphate content the products were highly stable, even in the presence of high basicities and aluminium concentration.

VIII. The appellant requested that the decision to refuse the application be set aside and the case remitted to the department of first instance in order to issue a communication under Rule 71(3) EPC on the basis of claims 1 to 12, filed by letter dated 31 March 2006 as a third auxiliary request, and a description to be adapted thereto.

Reasons for the Decision

1. Amendments

1.1 Claim 1 is based on a combination of claims 1 and 2 as originally filed. The value of 0.065 for the lower limit of the parameter n is taken from example 2. This latter amendment gives rise to the following considerations.

1.1.1 Correction of an obvious error regarding n

The value of $n = 0.065$ itself results from the correction of an error at page 9, line 7 (example 2) of the application documents, the value originally disclosed being 0.0065.

The proposed correction is allowable under Rule 139 EPC [2000] for the following reasons:

Firstly, it can be immediately recognised that the original value of $n = 0.0065$ in example 2 falls outside the range of $0.01 \leq n \leq 0.17$ of claim 1 as originally filed, although example 2 is intended to illustrate the invention. The value of $n = 0.0065$ is also in contradiction to the analytical composition of the product appearing immediately above (page 9, line 5). It is thus evident that an error must have occurred. Secondly, from the analysis of the compound reported at page 9, line 5, the molar ratio of SO_4 and Al may be calculated as 0.065, thus giving the correct subscript n .

1.1.2 Value of n taken from example

According to the established jurisprudence of the boards of appeal it is only permissible under Article 123(2) EPC to limit a claim to a specific embodiment by introduction of an isolated feature from a specific combination if that feature is not inextricably linked with other features of said combination. See T 1067/97 (4 October 2000; Reasons 2.1.3) and T 714/00 (6 August 2002; Reasons 3.3).

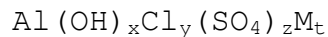
In the present case, the board considers said parameter n to be sufficiently independent from the other parameters l, m and p to be singled out from an example, because these parameters may be chosen freely and independently within the claimed ranges, of course observing electroneutrality. It can be seen from examples 1 to 5 that the basicity (defined as $(1/3 \times 100)$) of the claimed aluminium polychlorosulphates can be chosen within the claimed range of 58% to 75% by proper selection of the remaining parameters, independently of the molar Al/sulphate content n. Insertion of the value $n = 0.065$ as the lower limit of n in claim 1 is thus allowable under Article 123(2) EPC.

1.2 Claims 2 to 12 correspond to claims 3 to 13 as originally filed.

1.3 The requirements of Article 123(2) EPC are thus met.

2. *Novelty*

2.1 Document D1 discloses aluminium polychlorosulphate (PCSA) compounds, methods of preparing the same and their application in the treatment of water. Said PCSA compounds are characterised by the formula



wherein

M is an alkaline or earth alkaline metal;

$$1.80 \leq x \leq 2.30$$

$$0 \leq z \leq 0.05$$

$$0.200 \leq t \leq 0.515$$

$x + y + 2z = 3 + 2t$ if M is an earth alkaline metal and

$x + y + 2z = 3 + t$ if M is an alkaline metal,

and the ^{27}Al NMR spectrum of the compounds shows a signal at about $\delta = -6$ ppm (see D1, claim 1).

The basicity of the PCSA compounds is preferably at least 63%, more preferably at least 70% (see claim 4).

A preferred metal M is Ca (see page 4, line 31, and the example).

It will be appreciated that parameters x, z and t of D1 correspond to parameters l, n and p, respectively, of the application in suit.

2.2 Having regard to D1, the subject matter of claim 1 of the application in suit is novel because the molar sulphate content for one mole of Al, expressed by parameter n, is defined as $0.065 \leq n \leq 0.17$ and thus outside the respective range of parameter z according to D1 ($0 \leq z \leq 0.05$).

- The process according to claim 3 for preparing the PCSA compounds as defined in claim 1 and the uses according to claim 11 are novel for the same reason.
- 2.3 This finding of novelty over D1 is confirmed and further supported by the ^{27}Al NMR spectra of products D, E, F, obtained by the process of claim 3 and filed by the appellant as Annexes 1 to 4, in comparison with products A, B and C (products according to D1). Said ^{27}Al NMR spectra of products D, E and F do not exhibit the characteristic ^{27}Al peak at a chemical shift $\delta = - 6$ ppm which is characteristic for the D1 products (see claim 1 of D1).
- 2.4 Documents D2: EP-A-0 557 153 and D3: EP-A-0 794 153 disclose basic aluminium polychlorosulphates for the treatment of water and processes for their preparation. These PCSA compounds contain as metals M either alkaline earth metal ions in addition to alkaline metal ions, or they contain alkaline earth metal ions alone. See D2, claim 1; D3, claim 1. The examples of D2 concern mixed Ca/Na PCSA compounds, whereas comparative example 7 concerns a Ca - PCSA. Since the formula (I) in current claim 1 excludes the presence of alkaline earth metals, the claimed subject matter is novel over D2 and D3 at least for this reason.
- 2.5 The requirements of Article 54(1)(2) EPC are therefore met.

3. *Inventive step*

- 3.1 The board considers document D1 to represent the closest prior art because it deals with the same technical problem (aluminium polychlorosulphates for water treatment) and because the PCSA compounds proposed in D1 show the least structural differences with respect to the claimed compounds.

Starting from D1, the technical problem is to provide novel PCSA compounds having improved coagulating and flocculating power.

- 3.2 The appellant has provided additional experimental evidence for an improvement in coagulating power of a PCSA product having an n - value in the claimed range of from $0.065 \leq n \leq 0.160$, compared with lower - n products according to D1 (see in particular Tables 1 and 2 of Annex 5). More specifically, the tests reported in Annex A5 assess the quality of water treated with different PCSA compounds at various dosage levels by measuring the relative turbidity of the water decanted 10 minutes after treatment. Table 1 sets out the Al and SO₄ content and the calculated n - value of six samples of PCSA compounds, of which examples D, E and R are according to the invention ($0.065 \leq n \leq 0.17$) and samples A, B and C according to D1 (having an n - value below 0.065). Table 2 demonstrates that inventive examples D, E and F exhibit lower relative turbidity of the treated and decanted water at all dosage levels, thus indicating higher coagulating power, compared with examples A, B and C according to D1. These results show not only the superior suitability of the inventive PCSA compositions for water purification, but also underline

the criticality of the lower limit of n at 0.065 (as can be seen from a comparison of examples C and D). Similar positive results can be seen in the Table on page 10 of the description. Here again, the polychlorosulphates according to the invention (examples 1, 2 and 49 outperform both the product according to D1 (example 3) and the conventional polyaluminium chloride (PAC) and aluminium sulphate (S.A.) in terms of the relative turbidity of the treated water. With respect to the data on relative residual Al reported in said Table, the appellant has plausibly argued that the higher values obtained with the polychlorosulphates according to the invention could easily be brought down by adjusting the pH which was not possible for high turbidity values. Therefore, a better result in terms of relative turbidity outweighs the higher residual Al.

The board is therefore satisfied that an improvement has indeed been achieved and the above defined technical problem is solved by the claimed products.

3.3 It remains to be decided whether or not the claimed solution was obvious in the light of the prior art.

As discussed above, document D2 discloses PCSA compounds for water treatment having a similar composition which, however, contain both alkaline and alkaline earth metals in various ratios. Document D3 reveals mixed Ca/Na PCSA compounds and Ca - PCSA compounds, the former being highly preferred (all of the inventive examples of D3 being such mixed PCSA compounds).

While both D2 and D3 disclose an Al/SO₄ molar ratio (defined by the n value) of between $0 < n < 0.15$, there is no teaching to modify the PCSA compounds known from D1 by combining n values in the middle and higher subrange thereof with metal ions M selected from the group of alkaline metals only. Nor is there a hint in D2 or D3 that such combination would lead to products having an improved flocculating and coagulating power.

3.4 Therefore, the subject matter of claim 1 involves an inventive step. The requirements of Article 56 EPC are met.

3.5 The process of manufacture according to claim 3 and the use according to claim 11 contain - by way of back-reference - all the features of patentable claim 1. Dependent claims 2, 4 to 10 and 12 define preferred embodiments of the claimed compounds, processes and uses and thus also satisfy the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent on the basis of the set of claims 1 to 12, filed as third auxiliary request by letter dated 31 March 2006, and a description to be adapted thereto.

The Registrar

The Chairman

S. Fabiani

G. Raths