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Datasheet for the decision of 5 May 2010

Case Number: T 0230/07 - 3.3.05

Application Number: 01947491.5

Publication Number: 1292384

IPC: B01J 13/00

Language of the proceedings: EN

Title of invention:
Method for the preparation of a colloidal silicate dispersion

Patentee:
Paroc Oy Ab

Opponent:
ROCKWOOL INTERNATIONAL A/S

Headword:
Colloidal binder/PAROC

Relevant legal provisions:
EPC Art. 54(1)(2)(3), 56, 83, 123(2)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Sufficiency of disclosure (yes)"
"Novelty (yes)"
"Inventive step (yes): non-obvious alternative"

Decisions cited:
T 0198/84, T 0124/87, T 0279/89, T 0666/89, T 0012/90, T 0720/96, T 1233/05

Headnote:

Novelty and inventive step are two distinct requirements for the patentability of an invention and therefore different criteria should apply for their assessment. So, when assessing novelty of an invention, the presence or absence of a technical effect within a sub-range of numerical values is not to be taken into account in the assessment of novelty.

For establishing novelty of a sub-range of numerical values from a broader range, the selected sub-range should be narrow and sufficiently far removed from the known broader range illustrated by means of examples. A sub-range is not rendered novel by virtue of a newly discovered effect occurring within it.

Reasons 4.1.6.

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Case Number: T 0230/07 **-** 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 5 May 2010

Appellant II: (Opponent)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 8 December 2006 concerning maintenance of European patent No. 1292384 in amended form.**

Composition of the Board:

Chairman: G. Raths
Members: J.-M. Schwaller
H. Preglau

Summary of Facts and Submissions

I. The present appeals were lodged against the interlocutory decision of the opposition division maintaining the patent in amended form on the basis of a set of claims filed as second auxiliary request on 24 October 2006 with an independent claim 1 reading:

"1. Method for the preparation of a colloidal silicate dispersion containing silica and alumina, comprising

- *dissolving a particulate mineral material containing silica, alumina and alkali oxide(s), the amount of alumina being 10-25% by weight, the molar ratio between silica and alumina being in the range of 2-12 and the molar ratio of silica to the sum of alkali oxides being in the range of 10-350, in an acidic aqueous solution, to form a solution containing nucleated re-precipitated particles from the material,*
- *stabilizing the so obtained solution to form a dispersion, and*
- *optionally adjusting the dry matter content of the dispersion."*

II. During the opposition procedure, the parties relied *inter alia* on the documents:

D3: EP 0 059 088 A1

D5: WO 01/00916 A1

D6: Finnish priority application 991439

D7: Finnish priority application 19992124

D8: "*The Colloid Chemistry of Silica*", Horacio E. Bergna, American Chemical Society Publication, 1994, pages 6 to 9

D10: US 2 886 466

D12: WO 96/14454

III. In the contested decision, the opposition division held the claimed method to be sufficiently disclosed on the whole range claimed, in particular in the light of the examples and paragraphs [0025], [0030] to [0032] of the patent in suit. It also considered that a skilled person would be able to dissolve the mineral material and to identify the end of its dissolution as well as the means for stabilizing the size of the re-precipitated particles of the dispersion.

It nevertheless concluded that the subject-matter of claim 1 as granted lacked novelty in the light of document D5, considering the choice of the range of 2 to 12 for the silica to alumina molar ratio as being an arbitrary restriction since it was not associated with a new teaching.

Claim 1 as granted read as follows:

"1. Method for the preparation of a colloidal silicate dispersion containing silica and alumina, comprising

- *dissolving a particulate mineral material containing silica and alumina in a molar ratio in the range of 2-12 in an aqueous solution, to form*

a solution containing nucleated re-precipitated particles from the material,

- *stabilizing the so obtained solution to form a dispersion, and*
- *optionally adjusting the dry matter content of the dispersion.*"

IV. Appeals were lodged respectively by both the patentee (hereinafter "appellant I") and the opponent (hereinafter "appellant II").

V. With its grounds of appeal dated 4 April 2007, appellant I submitted eight sets of claims as a first to eighth auxiliary request, respectively.

VI. Together with its grounds of appeal dated 18 April 2007, appellant II filed, inter alia,

D13: GB 845 565

and raised objections under Articles 54, 56 and 83 EPC.

VII. On 24 August 2007, appellant I submitted its comments and contested the above objections.

VIII. On 3 September 2007, appellant II cited inter alia the decisions T 0124/87 and T 0279/89, and reiterated its novelty objections based on either of documents D5 and D10.

Under cover of a letter dated 5 September 2007, it submitted a further document:

D16: Man-made vitreous fibers: Nomenclature, Chemistry and Physical Properties by the Nomenclature Committee of TIMA Inc., 1993.

IX. In response to the summons to oral proceedings, appellant I submitted on 1 April 2010 ten sets of amended claims as new auxiliary requests 1 to 10, respectively.

X. On 6 April 2010, appellant II submitted two new documents:

D17: Sol-Gel Derived Binder for Inorganic Composites, Elin Nilsen et al., Journal of Sol-Gel Science and Technology, 26, 1239 to 1242, 2003;

D18: Model dissolution curves corresponding to Figure 3 of the patent

It also objected to the newly filed auxiliary requests under Articles 84 and 123(2) EPC.

XI. Under cover of a letter dated 13 April 2010, appellant I submitted twelve sets of amended claims as new auxiliary requests 1 to 12, respectively.

XII. During the oral proceedings, which took place on 5 May 2010, appellant I filed a new main request, claim 1 of which reads as follows (amendments in comparison to claim 1 as granted emphasized by the board):

"1. Method for the preparation of a colloidal silicate ***binder*** *dispersion containing silica and alumina* ***in a molar ratio of 2 to 12****, comprising*

- *dissolving a particulate mineral material containing silica and alumina in a molar ratio in the range of 2-12 in an **acidic** aqueous solution, to form a solution containing nucleated re-precipitated particles from the material,*
- *stabilizing the so obtained solution to form a dispersion, and*
- *optionally adjusting the dry matter content of the dispersion.*"

Appellant II challenged this claim under Articles 83, 54 and 56 EPC. It argued in particular that either of documents D3, D5, D10, D12 and D13 would anticipate its subject-matter. It also argued that starting from document D10, its subject-matter would lack an inventive step in combination with the teaching of D12 or alternatively, starting from D13, it would lack an inventive step in combination with common general knowledge.

XIII. Appellant I/the patentee requested that the decision under appeal be set aside and that the patent be maintained on the basis of the claims according to the main request filed at the oral proceedings before the board, or alternatively that the patent be maintained on the basis of one of the sets of claims according to auxiliary requests 1 to 12 dated 13 April 2010.

Appellant II/the opponent requested that the decision under appeal be set aside and that the patent be revoked.

Reasons for the Decision

1. Main request - Interpretation of claim 1

During the discussion at the oral proceedings, different questions arose as to how claim 1 had to be interpreted.

1.1 As to the question whether a distinction could be made between a colloidal dispersion and a suspension, the answer is affirmative in particular in view of the disclosure of document D8 - an extract of a well-known textbook relating to the colloid chemistry of silica - which defines the particle size in a colloidal dispersion as being of from 1 to 1000 nm and the region of suspensions as beginning at the upper end of the colloidal range (D8, page 6, lines 19 to 29).

According to the invention, the primary particle size of the dispersion is 1 to 1000 nm, preferably 10 to 100 nm (patent in suit, column 3, lines 44 to 46). So there are no doubts that the patent in suit relates to a dispersion.

1.2 As to the questions whether claim 1 would on the one hand require the dissolution of the particulate material to be complete and, on the other hand, exclude further processing steps, the board observes that claim 1 at issue just mentions the step of "dissolving a particulate mineral material" without however requiring that the dissolution be complete. Claim 1 does also not exclude the presence of further processing steps (see "Method … comprising …"), such as for instance the separation of non-dissolved

particulate mineral material, e.g. by centrifugation such as in the examples, or any other step.

2. Main request - Sufficiency of disclosure

2.1 Appellant II/the opponent asserted that there was a lack of sufficient disclosure over the whole scope of claim 1.

In support of this allegation, appellant II filed document D18 and argued that this document would show that, in particular, acetic acid did not enable full dissolution of a starting particulate mineral material containing silica and alumina in a molar ratio as defined in claim 1.

Concerning this particular argument, it is to be observed - see item 1.2 - that claim 1 does not require that the said dissolution be complete, and so this argument fails.

2.2 In its Examples 1 and 2, the contested patent describes in detail the preparation of binders according to the invention. The composition of the starting fibrous mineral material is therein specified and the dissolution of the silica-alumina containing fibres is studied with varying concentrations of formic acid. After dissolution, nucleation of the primary particles takes place in the solution with the particles showing steady growth with time. While in Example 1, stabilisation of the formed particles is obtained by addition of a polymer under constant mixing, in Example 2 the solution is further centrifuged to remove the impurities after dissolution of the fibres.

So, the examples show that the process claimed can be carried out under various conditions and without necessarily achieving full dissolution of the starting material.

2.3 The contested patent also provides in-depth details regarding:

- the starting mineral materials and the acids to be used (see paragraphs [0018] to [0022] and [0025]);

- the temperature range and the period of time necessary to achieve the required dissolution of the starting mineral materials (see paragraph [0030]);

- the stabilization of the colloidal dispersion (see paragraphs [0031] and [0032]), e.g. with surfactants and/or polymers. Suitable polymers and surfactants are exemplified.

2.4 At the oral proceedings, the attention of appellant II was further drawn to the fact that in the present case it would have been easy - e.g. by trial and error experimentation - to test the dissolution rate of different starting materials by varying e.g. the operative conditions and the type of acid, in order to prove its allegations.

In the absence of such tests and of any other convincing evidence, the board does not see any reason to doubt that the disclosure of the patent in suit is not sufficient for the invention to be carried out by a

person skilled in the art over the whole scope of claim 1 at issue.

2.5 For the above reasons, it is concluded that the contested patent meets the requirements of Article 83 EPC.

3. Main request - Allowability of the amendments

3.1 It has not been contested that the amended claims have a basis in the application as originally filed:

- Claim 1: claims 10, 1, 22 and 30 as filed;
- Claim 2: claim 11;
- Claim 3: claims 2 and 3;
- Claims 4 to 15: claims 12 to 23;
- Claims 16 to 19: claims 26 to 29.

3.2 The scope of protection conferred by the amended claims having furthermore not been extended over that of the claims of the patent in suit, the requirements of Article 123(2) and (3) EPC are fulfilled.

4. Main request - Novelty

Novelty has been contested:

- under Article 54(1)(3) EPC in the light of the disclosure of document D5 (also in combination with the disclosure of document D16), and

– under Article 54(1)(2) EPC in the light of the disclosure of either of documents D3, D10, D12 and D13.

4.1 Concerning document D5 (Article 54(1)(3) EPC)

4.1.1 The contested patent was filed on 19 June 2001 and claims priority of 20 June 2000 (FI 20001458).

Prior art document D5 - filed on 20 June 2000 and published on 4 January 2001 - claims priorities of 24 June 1999 (D6) and 1 October 1999 (D7). Its content - with the exception of the one and only example on page 10, which does not benefit from any of these priority dates - thus forms part of the state of the art pursuant to Article 54(3) EPC.

4.1.2 Bearing in mind the above remark regarding the example, document D5 (claim 1) discloses a method for making a binder comprising the following steps:

– dissolving a particulate mineral material having a glassy amorphous structure in an aqueous solution, to form a solution containing nucleated reprecipitated particles from the material,

– stabilizing the so obtained solution to form a sol having the desired particle size, and optionally

– adjusting the dry matter content of the sol.

Claim 8 further discloses that the aqueous solution is acidic.

According to D5, page 3, lines 11 to 17, the particulate mineral material can be a waste mineral wool product obtained from mineral wool production, or alternatively, a mineral wool product used as heat insulation in constructions.

According to a specific embodiment (D5, page 5, lines 20 to 24), the sol contains predominantly silica in combination with other metal oxides stemming from the starting mineral material, such as calcium oxide, magnesium oxide, aluminium oxide, and possibly further metal oxides in smaller amounts.

4.1.3 Appellant II/the opponent argued that the disclosure of a sol containing predominantly silica in combination with aluminium oxide corresponded to the implicit disclosure of a sol containing these ingredients in a molar ratio of "at least 1". As the sol claimed did not give rise to any particular advantage over the one disclosed in document D5, the sub-range of "2 to 12" defined in claim 1 at issue was to be considered as an arbitrary choice in view of the established jurisprudence (T 12/90, T 124/87 and T 279/89).

4.1.4 The board wants to underline that in order to conclude in favour of a lack of novelty, there must be a direct and unambiguous disclosure in a prior art document (here document D5) which inevitably leads the skilled person to something falling within the scope of what is claimed. In the present case, the sole disclosure in document D5 for the preparation of a silica-based sol containing other metal oxides is at page 5, lines 20 to 24, in the passage reading:

"According to the invention it is thus possible to provide sols containing predominantly silica in combination with other metal oxides stemming from the starting mineral material, such as calcium oxide, magnesium oxide, aluminium oxide and possibly further metal oxides in smaller amounts."

The question whether this passage is a direct and unambiguous disclosure for a sol containing silica **and** alumina is - according to established jurisprudence - to be answered positively, because in order to arrive at this combination of features the skilled person has to make only one choice in the list of "other metal oxides stemming from the starting mineral material".

As to the further question, whether said critical passage directly and unambiguously discloses a sol containing silica and alumina in a molar ratio of 2 to 12, the board notes that document D5 neither discloses explicitly a concrete value nor a range of values regarding the molar ratio between silica and any other metal oxide.

4.1.5 As to the appellant's II argument that a silica to alumina molar ratio of "at least 1" was implicitly disclosed in the passage at page 5 (lines 20 to 24) of D5, the board examined whether the alleged molar ratio of "at least 1" would be novelty-destroying with respect to the molar ratio of "2 to 12" defined in the subject-matter of claim 1 at issue.

According to decision T 279/89, reasons 4.1, (see also T 198/84 "Trichloroformiates"; OJ 1985, 209), a

selection of a sub-range of numerical values from a broader range is to be considered as novel when:

- the selected sub-range is narrow (*criterion 1*);

- the selected sub-range is sufficiently far removed from the known range illustrated by means of examples (*criterion 2*);

- the selected area does not provide an arbitrary specimen from the prior art, i.e. is not a mere embodiment of the prior description, but another invention (purposive selection)(*criterion 3*).

In the present case, as regards criteria 1 and 2, the board comments as follows:

(a) the open-ended range "> 1" defined by appellant II is unquestionably broad in comparison to the narrow range "2 to 12" defined in claim 1 at issue;

(b) the upper (infinite) limit of the range ">1" is far away from the upper limit "12" of the range "2 to 12" defined in claim 1 at issue;

(c) the lower limit "1" of the range ">1" is well below the lower limit "2" of the range "2 to 12" claimed (in terms of percentages, a silica to alumina ratio of 1 corresponds to 50% of each component, while a ratio of 2 corresponds to 66.6/33.3 % of alumina and silica, respectively, which values are far removed from the value 50% of a silica to alumina ratio of 1).

It follows from the above comments that the selected sub-range of "2 to 12" is **narrow and far removed** from the range ">1". According to appellant II the sub-range of "2 to 12" was implicitly disclosed in D5. Document D5, however, does not disclose any specific value as regards the alumina and/or silica content of the prior art sol (see item 4.1.4).

4.1.6 The question arises whether a technical effect over the sub-range is decisive for acknowledging novelty or not. In other words, is the presence of an effect only a confirmation of novelty of the sub-range, can or should said effect be ignored when assessing novelty, or is the presence of an effect mandatory for establishing a delimitation vis-à-vis the state of the art?

According to T 198/84 (point 7.), T 666/89 (point 8.) and T 720/96 (point 2.1.3), such a particular effect is neither a prerequisite for novelty nor can it as such confer novelty, its existence merely serving to confirm a finding of novelty already achieved.

In the board's view, the question whether the so-called "third criterion" according to decision T 279/89 or T 198/84 is fulfilled or not is for the following reasons of no relevance for assessing novelty of a sub-range singled out of a larger range.

Regarding specifically the condition of novelty for patentability, the board draws the attention to the following passage in decision T 198/84 (point 7.): *"when examining so-called selection inventions as to novelty,"* […] *"the sub-range singled out of a larger range is new not by virtue of a newly discovered effect*

occurring within it, it must be new per se", to which principle the board fully adheres.

For the board - in order to avoid any misunderstanding - the effect occurring in the sub-range should not be the decisive condition conferring novelty, because - the board following here decision T 1233/05, reasons 4.3 and 4.4 - the presence of an effect falls back upon considerations to be taken into account in the assessment of inventive step, and since inventive step and novelty are two distinct requirements for the patentability of an invention, different criteria are to be applied for their assessment.

The consequence of this conclusion is that the examination of the presence and relevance of an effect occurring in the sub-range is to be made under Article 56 EPC.

The two criteria, i.e. the narrowness of the sub-range ("the selected sub-range should be narrow") and the sufficient distance ("the selected sub-range should be sufficiently far removed from the known range illustrated by means of examples") remain conditional requirements for establishing novelty of a sub-range of numerical values from a broader range.

The meaning of the expressions "narrow" and "sufficiently far removed" has to be decided on a case-by-case basis.

4.1.7 During the discussion relating to the presence or absence of an effect - the so-called "third criterion" - appellant II referred to the following citations in

document D17 (page 1241, right column, first lines): "*Al is not incorporated into the silica network*"; "*the gel network mainly consists of silica with the other cations dissolved in the pore liquid*" and argued that the silicate binder claimed would not have the alleged "improved glassiness" disclosed in the contested patent.

The board does not accept this argument because the above citations simply disclose that aluminum is not incorporated into the silica network, what however does not constitute evidence that an improved glassiness was not obtained.

As to the effect underlying the invention, the contested patent (column 2, lines 48 to 52) discloses that the high alumina content of the dispersion provides for improved stability as compared to ordinary alkali water glasses, the alumina providing for improved glassiness and reduced crystallinity of the binder.

The board notes that this technical teaching is however not directly and unambiguously derivable from the disclosure of document D5. This means that even if the criteria laid down in decisions T 279/89 and T 198/84 had been applied, the selected area (molar ratio of "2 to 12") in the subject-matter of claim 1 ought to be considered as a "purposive selection" in the sense of these decisions, and not as an arbitrary choice from the prior art, as argued by opponent II or as concluded by the opposition division.

The board points out that independently of the fact that the third criterion would anyway be fulfilled in

the case at stake, it is however not this finding which renders the subject-matter of claim 1 at issue novel, since the technical effect has not been retained as the decisive condition conferring novelty (see item 4.1.6).

4.1.8 With respect to the other arguments presented by appellant II in favour of a lack of novelty of claim 1 at issue over document D5 in view of documents D16 and D17, the board observes that:

– It cannot be concluded from D16 that a silica to alumina ratio of 2 to 12 is conventional in mineral fibers used in heat insulating materials, because even if D16 might be considered as a general textbook relative to mineral fibers - which has been contested - this document clearly makes a distinction between glass wool on the one hand, and slag/rock wool on the other hand. Furthermore this document clearly establishes that alumina is always present in slag/rock wool but is not mandatory in glass wool. Further, it cannot be inferred from D16 that the silica to alumina molar ratio in slag/rock wool inevitably falls within the range defined in claim 1 at issue. In conclusion, it is not directly and unambiguously derivable from D16 that the silica to alumina molar ratio of a mineral wool used for heat insulating purposes would inevitably fall within the range of 2 to 12 defined in claim 1 at issue. In conclusion, D16 does not provide any information - in particular as regards the molar ratio of alumina and silica in mineral fibers - which might implicitly be read in combination with the content of document D5.

– Claim 1 at issue is silent as regards the potential incorporation of aluminum into the silica network, so the argument of appellant II - that document D17 provides evidence that aluminum was not incorporated into the network of silica in the sol defined in claim 1 at issue - cannot be accepted.

4.1.9 It follows from the above reasoning that in the present case, criterion 1 (narrow range) and criterion 2 (sub-range sufficiently far removed from the known range illustrated by means of examples) are met, and the critical passage in D5 (page 5, lines 20 to 24) cannot be considered as a direct and unambiguous disclosure which inevitably leads the skilled person to something falling within the scope of what is claimed.

4.1.10 With respect to the further decisions referred to by appellant II, the board observes that the present case concerns the selection of a sub-range of numerical values from a broader range, so it is not comparable with T 12/90, where the novelty of a vast family of chemical compounds defined by a general structural Markush formula had to be assessed in the light of a prior art disclosing another family defined by a general structural Markush formula and overlapping with the first family.

For the same reason, the present case is also not comparable with T 124/87, which concerned a further problem of overlapping of classes of compounds.

4.1.11 Consequently, having regard to the reasons given in items 4.1.1 to 4.1.10 supra, the subject-matter of

claim 1 at issue, in particular the selected silica to alumina molar ratio of 2 to 12, is not directly and unambiguously derivable from the disclosure of document D5.

The subject-matter of claim 1 is therefore novel in respect of document D5 (Article 54(1)(3) EPC).

4.2 Concerning document D3 (Article 54(1)(2) EPC)

4.2.1 Document D3 discloses an aqueous alkali metal silicate solution suitable for use as a binder and which has been made by a method comprising dissolving a silica powder in aqueous alkali, characterised in that the silica powder contains impurities that are insoluble in aqueous alkali and the impurities are suspended in the solution as a stable suspension by means of a suspending agent (claim 1). Typical soluble impurities include alumina and compounds of sodium and potassium, all of which may be present in amounts of at least 0.1%. The amount of alumina is generally below 2% but higher amounts, for instance up to 5% (measured as the oxide), may be present as compounds of sodium or potassium (page 4, lines 28 to 33).

4.2.2 The board notes that the presence of alumina in an amount of up to 5% in the starting silica corresponds to a silica to alumina molar ratio higher than the upper limit "12" of the range "2 to 12" defined in claim 1 at issue. Furthermore the process according to D3 requires an aqueous **alkali** for dissolving the starting material. In this context, novelty cannot be disputed in the light of document D3, since the subject-matter of claim 1 at issue requires that the

dissolution be carried out in an acidic aqueous solution.

4.3 Concerning document D10 (Article 54(1)(2) EPC)

4.3.1 This prior art document discloses (claim 1) a binder composition comprising a sol of silica particles having an average diameter of 3 to 150 nm, a clay having a particle size of less than 10 µm, and a soluble aluminum compound which in solution forms aluminum ions, the weight proportions of the silica of the sol expressed as SiO_2, the clay, the aluminum compound expressed as Al_2O_3 being in the range of 1:0.5 to 10.0:0.1 to 0.0025, and the binder having a pH in the range of 2 to 7.5 and a solids content of from 1 to 60% by weight.

In Example 1 of D10, the binder composition is made with colloidal silica sol, clay and a component supplying aluminum ions. The silica sol contains 30% by weight of silica as SiO_2, has an SiO_2:Na_2O weight ratio of 285:1 and the average particle diameter of the silica is 17 nm. The clay shows the following particle sizes:

- 100% less than 10 microns
- 95% less than 5 microns
- 77% less than 2 microns.

To make the binder, silica sol is diluted with water and clay is added slowly with rapid agitation. An anti-punking agent and water are then added with stirring. The mixture is further diluted with water and stirred

vigorously to give a dispersion having a solids content of 90% and a pH of 6.5 to 7.0. The mixture is then acidified by adding enough 25% formic acid to lower the pH to the range of 3.2 to 3.5. The aluminum ion is then added in the form of basic aluminum formate solution containing aluminum ion equivalent to 8.5% Al_2O_3. One part of a wetting agent ("Triton" X-1 14) is finally added.

4.3.2 The appellant argued that the formic acid used in Example 1 inevitably dissolved the kaolin clay - which has a silica to alumina ratio of 2 - and so D10 disclosed a process falling under the scope of protection of claim 1 at issue. The appellant further argued that since the wording of claim 1 at issue allowed the presence of suspended particles, such as the clay particles having a size of less than 10 µm as defined in claim 1 of D10, there was no doubt in case the clay used in Example 1 would not be totally dissolved, that this prior art destroyed the novelty of the subject-matter defined in claim 1 at issue.

4.3.3 The board cannot share this view because although it cannot be denied that kaolin clay would to a certain extent be dissolved in formic acid, there is no doubt from claim 1 of D10 - which requires the binder to contain clay particles with a particle size of less than 10 µm (i.e. particles which do not have a colloidal size) and a silica to alumina molar ratio of 1:0.1 to 0.0025 (i.e. a molar ratio far below the ratio defined in claim 1 at issue) - that the binder composition claimed in D10 is not a colloidal silicate dispersion containing silica and alumina in a molar ratio of 2 to 12, but the so-called "uniform

suspension" disclosed at column 3, lines 35 and 36 of D10.

4.3.4 For the above reasons, the skilled person reading D10 cannot derive directly and unambiguously therefrom that the kaolin clay - a particulate mineral material containing silica and alumina having a molar ratio falling in the range of 2 to 12 - would be dissolved in such proportions that inevitably a colloidal silicate dispersion containing a silica to alumina in a molar ratio of 2 to 12 would be obtained by carrying out the process disclosed in D10, in particular Example 1.

4.4 Concerning document D12 (Article 54(1)(2) EPC)

4.4.1 This state of the art concerns fibres which have a good dissolution rate at pH 4.5, thereby facilitating clearance from the lungs by macrophages and thus promoting genuine biodegradability (page 4, lines 8 to 12). Claim 1 of D12 discloses a product comprising man-made vitreous fibres formed of a composition which includes, by weight of oxides:

- SiO_2 32 to 48%
- Al_2O_3 18 to 30%
- CaO 10 to 30%
- MgO 2 to 20%
- FeO 2 to 15%
- $Na_2O + K_2O$ 0 to 10%

– TiO_2 0 to 6%

– Other elements 0 to 15%,

which composition has at 1400°C a viscosity of 10 to 70 poise, and the fibres have a dissolution rate of at least 20 nm per day when measured at a pH of 4.5.

4.4.2 The appellant argued that the test by which the dissolution rate of the fibres was determined would anticipate the process defined in claim 1 at issue.

In fact, the test protocol at page 8, line 26 to page 9, line 24 comprises the following operations:

300 mg of fibres are placed in polyethylene bottles containing 500 ml of a solution adjusted to pH 7.5 or 4.5, respectively. Once a day the pH is checked and if necessary adjusted by means of HCl.

The tests are carried out during a one week period. The bottles are kept in a water bath at 37°C and shaken vigorously twice a day. Aliquots of the solution are taken out after one and four days and analysed for Si.

The fibre diameter distribution is determined for each sample, and based on the dissolution of SiO_2 the specific thickness dissolved is calculated and the rate of dissolution established (nm/day).

4.4.3 In the board's view, it cannot be contested that the above test discloses the dissolution in an acidic aqueous solution of mineral fibers having the required silica to alumina (for instance the fiber D - which

according to the table at page 11 has the highest dissolution rate - has a silica to alumina ratio of 2.6).

However, contrary to the subject-matter of claim 1 at issue - which requires a stabilization step of the obtained solution - D12 does not disclose such an operation, and at least for this reason D12 does not directly and unambiguously disclose a method for the preparation of a colloidal silicate dispersion according to claim 1 at issue.

4.5 Concerning document D13 (Article 54(1)(2) EPC)

4.5.1 In Example I of D13 - that the appellant held to anticipate the subject-matter of claim 1 at issue - kaolin is intimately mixed with anhydrous sodium carbonate, and the resultant mixture is calcined at a substantially constant temperature within the range of 500 to 1000°C. The product of the calcination - a sodium aluminum silicate or a mixture of sodium aluminum silicates having the approximate composition $NaAlSiO_4$ - is then ground and dissolved in a 20% aqueous solution of sulphuric acid, or a 50% solution of hydrochloric acid, to make the pH value of the solution approximately 2. All the sodium aluminum silicate reacts and dissolves. A residue may be left of unreacted meta-kaolin, mineral acid salts of sodium and small quantities of impurities which were present in the original raw materials. In this case, the solution may be filtered to remove the undissolved substances. Ammonia or ammonium hydroxide is then added to increase the pH value to above 5 (preferably between 7 and 8) and the gel formed is washed and dried.

4.5.2 Appellant II argued that the intermediate product formed before addition of ammonia or ammonium hydroxide would be a colloidal silicate dispersion having a silica to alumina ratio falling within the terms of claim 1 at issue. It further argued that since claim 18 of the main request, which depends on claim 1 at issue, discloses the additional step of forming a gel, D13 would thus also disclose the subject-matter of claim 1 taken in combination with claim 18 of the main request at issue.

The board cannot accept the above arguments because, even if there might be no doubt as to the disclosure of D13 of an intermediate silicate solution, there is however no time left in the process of D13 for the further steps defined in claim 1 at issue, namely for "forming a solution containing nucleated re-precipitated particles" **and** for "stabilizing the so obtained solution to form a dispersion".

That dependent claim 18 of the contested patent envisages the preparation of a gel does not have any influence on the above conclusion, since the features necessary for obtaining a dispersion falling within the terms of claim 1 at issue are neither disclosed nor suggested in D13, and so the combination of claim 1 and claim 18 of the main request can also not be disclosed in D13.

4.6 Novelty - conclusion

For the above reasons, the subject-matter of claim 1 (and by the same token also that of dependent claims 2

to 19, which include all the features of claim 1) is novel and meets the requirements of Article 54 (1) (2) (3) EPC.

5. Main request - Inventive step

5.1 The contested patent is directed to a method for the preparation of a colloidal silicate dispersion, i.e. a silicate containing sol, suitable for use as a binding agent in paragraphs [0001] and [0007].

5.2 According to the "problem-solution approach" developed by the boards of appeal, the first step consists in identifying the closest state of the art document, which - according to established case law - is supposed to disclose subject-matter aiming at the same objective as the claimed invention and having the most relevant technical features in common, i.e. requiring the minimum of structural modifications.

5.2.1 In the present case, as appellant II considered two documents (D10, D13) as the potential starting points for assessing inventive step, it has to be decided which one is the closest to the alleged invention.

In this respect, it is observed that document D13 aims at the production of a mixed alumina/silica gel (claim 1) while D10 relates to the preparation of a binder composition comprising a sol of silica particles (claim 1).

5.2.2 Since document D13 neither discloses nor suggests the features necessary for obtaining a colloidal silicate dispersion, let alone for obtaining a dispersion

falling within the terms of claim 1 (see also item 4.5.2), in the board's view the closest state of the art cannot be represented by this document.

5.2.3 Whether D10 is the closest state of the art is also disputable in the board's view, because - as explained in item 4.3.3 - this document does also not disclose the preparation of a colloidal silicate binder dispersion, but the preparation of a binder in the form of a suspension.

Since D10 however has the most relevant technical features in common with the subject-matter of claim 1, and so requires the minimum of structural modifications to arrive at the latter, in the absence of any closer document among those relied on in these appeal proceedings, D10 might be taken as the starting point for assessing inventive step.

5.3 As regards the problem to be solved in the light of D10, the improvement of glassiness and the reduction of cristallinity cannot be retained since a comparison with examples according to D10 is not on file. The board agrees with appellant II/the opponent that it can be seen in the provision of an alternative method of preparing a stable colloidal silicate binder dispersion.

5.4 As a solution to this problem, the patent in suit proposes a process as defined in claim 1 characterised in particular in that the particulate mineral material containing silica and alumina in a molar ratio in the range of 2 to 12 be dissolved so as to obtain a colloidal silicate dispersion containing silica to alumina in a molar ratio of 2 to 12.

5.5 As to the question whether the problem has actually been solved, the board observes that the contested patent describes in detail - in particular in its Examples 1 and 2 - the preparation of binders according to claim 1 at issue, and so the proposed technical solution solves the problem defined in item 5.3. This issue has by the way not been contested.

5.6 The question which remains to be decided is whether or not the proposed solution is obvious in view of the known state of the art.

5.6.1 In this connection, the board first of all observes that none of the state of the art cited in these proceedings discloses or suggests to dissolve a silica and alumina-containing particulate mineral material in an aqueous acidic solution with the aim of producing a stable colloidal silicate dispersion containing silica and alumina in a molar range of 2 to 12.

5.6.2 So, the skilled person starting from D10, and faced with the problem indicated in item 5.4 cannot find any incentive in said documents in order to arrive at the subject-matter of claim 1 at issue.

5.6.3 Appellant II argued that the content of document D12, which disclosed mineral fibers with a silica to alumina molar ratio in the range of from 2 to 12, would prompt the skilled person at the claimed subject-matter.
The board cannot accept this argumentation because although document D12 discloses that a material having a silica to alumina molar ratio in the range claimed might dissolve in an aqueous acidic solution, no hint

is given in D12 as to how a person skilled in the art should proceed to convert this material into a colloidal silicate dispersion.

5.6.4 Also, even if D13 is taken as a starting point for assessing inventive step - as did appellant II - the problem to be solved in the light of this state of the art would be the same as outlined under item 5.3, namely the provision of an alternative method of preparing a stable colloidal silicate binder composition. The argument of appellant II that the subject-matter of claim 1 at issue would lack an inventive step in the light of document D13 taken in combination with common general knowledge does not take into account the difference to be made between a solution and a stable colloidal dispersion. As explained in item 4.5.2, although the production of a solution containing silica and alumina in a molar range of 2 to 12 as an intermediate product might implicitly be disclosed in D13, no indication is however given as to how the skilled person would have to proceed in order to arrive at a colloidal silicate dispersion.

5.6.5 As regards the argument that the skilled person would arrive at the subject-matter claimed using common general knowledge, in the absence of evidence e.g. from a general textbook that it was common general knowledge to convert an acidic solution containing silica and alumina into a stable colloidal silicate dispersion, the board is of the opinion that any lack of inventive step argumentation based either on D10 or D13 in order to arrive at the subject-matter of present claim 1 at issue is based on hindsight considerations.

5.7 In view of the above findings, and in view of the fact that none of the other documents cited in these proceedings lead in an obvious way to the subject-matter of claim 1 at issue, and by the same token to that of dependent claims 2 to 19 which include all the features of claim 1, the claims according to the main request involve an inventive step pursuant to 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 first instance with the order to maintain the patent in amended form on the basis of claims 1 to 19 of the new main request filed at the oral proceedings, and a description to be adapted accordingly.

The Registrar: The Chairman:

C. Vodz G. Raths