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**Datasheet for the decision
of 22 October 2008**

Case Number: T 0051/03 - 3.3.05

Application Number: 98104575.0

Publication Number: 0877001

IPC: C02F 3/12

Language of the proceedings: EN

Title of invention:

Sedimentation acceleration agent for activated sludge and
method for using the same

Applicant:

Kurita Water Industries Ltd.

Headword:

Sedimentation accelerating agent/KURITA

Relevant legal provisions:

EPC Art. 56

Relevant legal provisions (EPC 1973):

-

Keyword:

"Inventive step (main request and auxiliary request 1): no -
re-definition of the problem - obvious alternative"

Decisions cited:

-

Catchword:

-



Case Number: T 0051/03 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 22 October 2008

Appellant: Kurita Water Industries Ltd.
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Shinjuku-ku
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Representative: Dorn, Dietmar
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 5 September 2002
refusing European application No. 98104575.0
pursuant to Article 97(1) EPC 1973.

Composition of the Board:

Chairman: G. Raths
Members: J.-M. Schwaller
S. Hoffmann

Summary of Facts and Submissions

- I. The present appeal lies from the decision of the examining division refusing application 98104575.0
- II. The examining division held that the subject-matter of claim 1 of the sole request then on file was not new in view of
- (1) US-A-4 735 725
- and
- (2) JP-A-07 080491.
- III. An appeal was filed against this decision. Under cover of the letter dated 18 December 2002, the appellant filed a main request and an auxiliary request.
- IV. In the communication dated 4 July 2008 the Board informed the appellant that the subject-matter of claim 1 of the main request and of the auxiliary request filed under cover of the letter dated 18 December 2002 would not be new in view of documents (1) and (2).
- V. Under cover of the letter dated 30 September 2008 the appellant filed a new main request and a new auxiliary request.
- VI. In the board's communication dated 17 October 2008, questions were raised under Articles 123 (2) EPC and 56 EPC.

VIII. During the oral proceedings which took place on 22 October 2008, the appellant replaced the requests on file by a new main request and a new auxiliary request 1.

Claim 1 of the main request read as follows:

"1. A method for accelerating sludge sedimentation and concentrating said sludge, said method comprising the steps of:

(a) aerating a mixture of (i) concentrated activated sludge comprising activated sludge, magnetized powder which is prepared by crushing a block of material capable of forming permanent magnets, magnetized to a desired strength, and non-magnetized powder of magnetic material wherein a weight ratio of said magnetized powder to said non magnetized powder is between 5:95 and 95:5, and (ii) waste water comprising water and organic matter to form an aerated mixture in an aeration chamber;

(b) transferring said aerated mixture to a sedimentation chamber;

(c) concentrating and sedimenting activated sludge from said aerated mixture through gravity and the magnetic field of said magnetized powder within said mixture to form concentrated activated sludge; and

(d) returning a portion of said concentrated activated sludge to said aeration chamber for reuse in step (a) for continuous operation."

Claim 1 of the auxiliary request 1 differs from claim 1 of the main request in that the following passage had been added at the end of claim 1 of the main request.

"(e) whereby the mixture of the prepared magnetized powder and the non-magnetized powder, together with waste water and the returned portion of concentrated activated sludge, mixed in a mixing chamber, is adjusted as desired, for adding the mixture to the aeration chamber."

VIII. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the main request, or alternatively, on the basis of the claims of the auxiliary request 1, both requests having been filed at the oral proceedings.

Reasons for the decision

1. Main request

1.1 Article 56 EPC

1.1.1 The purpose of the patent application in suit is the provision of a sedimentation acceleration agent for activated sludge (specification as published (A1), column 1, lines 5 to 6).

Such an accelerating agent can concentrate sedimented sludge in a sedimentation chamber of an activated sludge processing system (column 1, lines 8 to 10).

Activated sludge is an aggregate of various microorganisms. The waste water is aerated and mixed with the activated sludge. Organic matter in the waste water is biologically oxidized and broken down. A portion of this oxidised organic matter is converted to

activated sludge (microorganism biomass), and another portion of the oxidized organic matter is broken down to carbon dioxide and water. The activated sludge forms flocculate clumps and floats in the mixed liquor (see column 1, lines 20 to 29).

- 1.1.2 According to the description of document (1) the invention relates to a process for the "improved" (column 3, line 4) separation of clarified liquid from biomass in the aerobic and/or anaerobic biological treatment of sewage; the biomasses or activated sludges are combined in the clarified liquid with magnetically separable inorganic materials. The biomasses containing these additives can be sedimented and/or they can be separated in magnetic fields (column 3, lines 3 to 8 and 12 to 14).

The method for sedimentation and concentrating activated sludge as illustrated in particular in figure 1 and concerning test plant II according to document (1) comprises the steps of:

- aerating a mixture of concentrated activated sludge comprising activated sludge, a magnetic inorganic material in the form of a powder such as magnetite powder i.e. magnetic iron oxide Fe_3O_4 and waste water;
- transferring said aerated mixture to a sedimentation chamber (figure 1, reference sign 4);
- concentrating and sedimenting said activated sludge through gravity and the magnetic field of said magnetic powder (figure 1, reference sign 6);
- returning a portion of said concentrating active sludge to said aeration chamber (figure 1, reference 7) (see column 4, line 60 to column 5, line 20; figure 1, reference signs 2 and 3).

All these steps can be read in the method according to claim 1 of the application in suit.

As a portion of the concentrated activated sludge containing particles of the magnetic material is returned to the aeration chamber, the rest, i.e. the surplus sludge is removed via the bypass (column 5, lines 10 to 12; figure 1, reference sign 8). So, as admitted by the appellant, the portion of magnetic inorganic material which is removed from the system has to be replaced by adding a corresponding amount of fresh powder to the activated sludge. In this way the required level of magnetic inorganic material is maintained during the continuous operation. The activated sludge will therefore contain a portion of fresh, i.e. non-magnetized powder and a portion of recycled powder. The latter is automatically magnetized either with a magnetic grid installed in the final settling plant or with a magnetic roller (column 5, lines 65 to 68; figure 2; column 6, lines 55 to 60; figure 3).

The magnetic inorganic materials have average particle sizes of preferably less than 10 μm , most preferably less than 3 μm , for example 0.1 to 1 μm (column 4, lines 48 to 51). These materials manifestly fulfil the requirement of the magnetized powder according to claim 1, which is obtained by crushing a block of material capable of forming permanent magnets, magnetized to a desired degree.

- 1.1.3 During the oral proceedings document (1) was taken as the starting point for assessing inventive step since according to this document it has been found that

magnetically separable materials, to be used as carrier materials, provide for rapid settling of the activated sludge (column 2, lines 53 to 57) which objective is close to the purpose of the application as filed, namely the provision of a sedimentation acceleration agent for activated sludge.

- 1.1.4 As to the problem underlying the application in suit in the light of the teaching of document (1), during oral proceedings, the appellant defined this problem as the increase of the performance of sewage treatment plants without constructional modifications and without additional energy input.

As a solution to this problem the application in suit proposes a method according to claim 1 characterized in that a weight ratio of magnetized to non magnetized powder is between 5:95 and 95:5.

- 1.1.5 It first has to be examined whether the problem is actually solved.

According to figure 3 of the application in suit the volatile suspended solid concentration (VSS) of the mixed liquor (ML) in the aeration chamber (hereinafter "MLVSS") i.e. the biomass concentration becomes high and it is said that high load operation in the aeration chamber is achieved.

The application in suit teaches that if the ratio of magnetized powder is less than 5% by weight, the MLVSS concentration in the aeration chamber cannot be increased significantly (column 5, lines 31 to 34). The graph of figure 3 corroborates this teaching since in

the ratio range of 0:100 to 5:95, MLVSS is raised from about 7 500 to about 20 000 mg/l; further the graph shows that between a ratio of 5:95 to 95:5, the MLVSS concentration is more or less constant and lies between 20 000 mg/l and 21 000 mg/l.

The board notes however that between a ratio of 95:5 and 100:0, the performance of sedimentation is between 20 000 and 21 000 mg/l as well.

During the oral proceedings the appellant argued that in the process according to document (1) the steady state is reached when 100% of powder is magnetized, magnetization being effected by the permanent magnet which is either the roller or the grid installed in the final settling tank.

The board concludes:

(a) that the state at which 100% of the powder is magnetized in the process according to document (1) corresponds to a ratio of 100:0 magnetized powder to non magnetized powder of the process according to the application in suit;

(b) that the state of 100% magnetized powder in the process according to document (1) corresponding to a ratio of 100:0 magnetized powder to non magnetized powder fulfils the requirement of exceeding the lower limit of 5 % magnetized powder resulting from the lower range value of 5:95 magnetized powder to non magnetized powder of the process according to the application in suit;

(c) that at such a state as defined under (a) the performance of the process according to the application in suit is not different from that of ratios between 5:95 and 95:5, namely a sedimentation of between 20 000 and 21 000 mg/l is also obtained at a ratio of 100:0 as shown in figure 3 of the application as filed. In other words, as compared to a ratio of 100:0 which is state of the art according to the method of document (1), the problem of increasing the performance of sewage plants as defined under point 1.1.4, first paragraph is not solved with the ratio range of 5:95 to 95:5.

The conclusion is that the problem underlying the application in suit has to be re-defined in less ambitious terms, namely in the provision of an alternative method.

1.1.6 The Board is satisfied that this less ambitious problem is actually solved by the method according to claim 1.

1.1.7 The next question to be answered is whether the method according to claim 1 is obvious in the light of the cited prior art documents.

1.1.8 The appellant argued that starting the process with the addition to the aeration chamber of the mixture of magnetized powder to non magnetized powder in a ratio of 5:95 to 95:5 would not be obvious. Furthermore the process claimed does not comprise the step of applying a magnetic field.

1.1.9 The Board does not agree with the arguments of the appellant for the following reasons:

As was already mentioned in the communication of the Board dated 4 July 2008, the activated sludge according to the method according to document (1) contains a portion of non-magnetized powder and a portion of recycled, i.e. magnetized powder. The magnetized powder stems from the magnetization by a magnetic grid or a magnetic roller. At the oral proceedings the appellant conceded that the combination of magnetized and non magnetized powder was present during the operation according to the method of document (1).

The discussion under point 1.1.5 concerning, on the one hand, the ratio range of from 5:95 to 95:5 of magnetized powder to non magnetized powder and, on the other hand, the alleged importance of the minimum value of 5% magnetized powder, has already revealed the irrelevance of these concentrations for contributing to inventive step.

As to the argument relating to the starting step of the method by mixing magnetized and non magnetized powder in the aeration chamber whereby the magnetization in that case took place previously to the starting step, it is only an obvious variation on the magnetization step according to the method of document (1) wherein this step takes place during the process. Furthermore, because of the presence of the word "comprising", the application of a magnetization field is not excluded and it is not excluded that only non magnetized powder be added before reaching the steady state at the claimed ratio of 5:95 to 95:5.

1.1.10 For the above reasons the subject-matter of claim 1 does not comprise an inventive step as required by Article 56 EPC.

2. Auxiliary request 1

2.1 The subject-matter of claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the passage

"(e) whereby the mixture of the prepared magnetized powder and the non-magnetized powder, together with waste water and the returned portion of concentrated activated sludge, mixed in a mixing chamber, is adjusted as desired, for adding the mixture to the aeration chamber"

was added to the end of claim 1 of the main request.

2.2 The reasoning as outlined under items 1.1.1 to 1.1.10 applies mutatis mutandis to the subject-matter of claim 1 of the auxiliary request.

Mixing the magnetized powder, the non magnetized powder, the waste water and the returned portion of concentrated activated sludge in a mixing chamber before adding this mixture to the aeration chamber is a further step which implies displacing the magnetization step outside the continuous operation and hence it only constitutes an obvious variation of the method of document (1) wherein the magnetization step takes place during the process.

2.3 For the above reasons the subject-matter of claim 1 of auxiliary request 1 does not comprise an inventive step as required by Article 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed

Registrar:

Chairman:

C. Vodz

G. Rath