

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [-] To Chairmen
- (D) [X] No distribution

**Datasheet for the decision
of 2 December 2024**

Case Number: T 2608/22 - 3.3.05

Application Number: 16772972.2

Publication Number: 3279154

IPC: C02F3/12

Language of the proceedings: EN

Title of invention:

METHOD FOR FORMING AEROBIC GRANULES AND METHOD FOR TREATING
WASTEWATER

Patent Proprietor:

Organo Corporation

Opponent:

HaskoningDHV Nederland B.V.

Headword:

aerobic granule method/Organo

Relevant legal provisions:

EPC Art. 56

Keyword:

Inventive step - (no)

Decisions cited:

T 0939/92, T 0261/19

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0

Case Number: T 2608/22 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 2 December 2024

Appellant: HaskoningDHV Nederland B.V.
(Opponent) Laan 1914 nr. 35
3818 EX Amersfoort (NL)

Representative: Nederlandsch Octrooibureau
P.O. Box 29720
2502 LS The Hague (NL)

Respondent: Organo Corporation
(Patent Proprietor) 1-2-8, Shinsuna
Koto-ku
Tokyo 136-8631 (JP)

Representative: Müller-Boré & Partner
Patentanwälte PartG mbB
Friedenheimer Brücke 21
80639 München (DE)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
2 December 2022 concerning maintenance of the
European Patent No. 3279154 in amended form.**

Composition of the Board:

Chairman G. Glod
Members: S. Besselmann
S. Fernández de Córdoba

Summary of Facts and Submissions

- I. The appeal of the opponent (appellant) is against the opposition division's interlocutory decision according to which European patent EP 3 279 154 B1 in amended form on the basis of what was then auxiliary request 6, filed during oral proceedings before the opposition division, met the requirements of the EPC.
- II. The sole claim according to that request - now the main request - reads as follows, with feature labelling used by the parties in square brackets:
- "[1a] A method for forming aerobic granules*
[1b] using a semibatch reactor (10),
[1c] the method comprising forming aerobic granules
[1d] by repeatedly performing a cycle comprising an introduction step of introducing an organic matter-containing wastewater containing organic matter,
[1e] a biological treatment step of biologically treating treatment target substances in the organic matter-containing wastewater using a microbial sludge during which an oxygen-containing gas is supplied to the semibatch reactor (10),
[1f] a settling step of allowing the microbial sludge to settle,
[1g] and a discharge step of discharging a biologically treated water that has been biologically treated,
wherein
[1i] the sludge is withdrawn such that a sludge retention time is 5 to 25 days and
[1h1] a value A is defined by multiplying the ratio of the BOD load introduced into the semibatch reactor (10) to the MLSS concentration by the ratio of the total cycle time to the reaction time, which is the time of the biological treatment step,

[1h2] and the ratio (BOD load/MLSS concentration) is controlled and the reaction time is adjusted so that A falls within a range from 0.05 to 0.25 (kgBOD/d)/kgMLSS [1h3] and so that a starved state and a satiated state are repeated, the bacteria producing viscous substances which cause the bacteria and the like to adhere strongly together, leading to the formation of aerobic granules, and [1k] a biologically treated water outlet (12d) of the semibatch reactor (10) is provided above a wastewater inlet (12a), [1l] and the biologically treated water is discharged from the biologically treated water outlet (12d) [1m] by introducing the organic matter-containing wastewater into the semibatch reactor (10)."

In auxiliary request 1, the range for value "A" in feature [1h2] has been amended to read "0.1 to 0.16 (kgBOD/d)/kgMLSS".

Auxiliary request 2 differs from auxiliary request 1 in that the range for the sludge retention time (SRT) (feature [1i]) has been amended to "10 to 15 days".

III. The following documents are of relevance to this decision.

- E5 Environmental Protection Agency, "Wastewater Treatment Manuals: Primary, Secondary and Tertiary Treatment", Ireland, 1997
- E8 Stowa, "Aëroob Korrelslibtechnologie - Pilot-onderzoek naar de toepassing voor de behandeling van huishoudelijk afvalwater", rapport 2005-35, Utrecht, 2006

- E8a English translation of E8: Stowa, "Aerobic granular sludge technology - pilot research on application for the treatment of municipal wastewater"
- E12 AVT-DVWK (German Association for Water, Wastewater and Waste) Rules and Standards, ATV-DVWK-A 131E, "Dimensioning of Single-Stage Activated Sludge Plants", May 2000
- E17b G. Chen et al., "Biological Wastewater Treatment - Principles, Modeling and Design", IWA Publishing 2020, 2nd edition, pages 136 - 138

IV. The arguments of the patent proprietor (respondent), where relevant to the decision, can be summarised as follows.

E8 was not a suitable starting point for assessing inventive step because it did not concern the stable formation of aerobic granules. In fact, the only document that could qualify as the closest prior art was another document.

The objective technical problem was to form aerobic granules in a stable and efficient manner. This problem was solved by the claimed combination of features, in particular by the SRT and by adjusting the reaction time - which implied active control - so that the "A" value was within the claimed range. This applied all the more to "A" and SRT values within the narrow ranges according to auxiliary request 2. The examples in the patent in suit, in particular conditions 5, showed that the technical problem was successfully solved. The type of wastewater or the temperature might also have an effect, but the claim required steering the process

towards granule formation within the constraints imposed.

The skilled person would find no incentive in the prior art to select a combination of values within the claimed narrow ranges of auxiliary request 2. An inventive step should therefore be acknowledged.

There were no additional remarks regarding the higher-ranking requests.

V. The appellant's arguments are reflected in the reasons for the decision below. In support of their arguments, they provided calculations of parameters regarding E8 in Annex 2 of the statement of grounds of appeal: Assessment of parameter A and SRT in E8, which corresponded to Annex 2 of the notice of opposition.

VI. The opponent (appellant) requests that the decision under appeal be set aside and the patent be revoked.

The patent proprietor (respondent) requests that the appeal be dismissed (main request), or alternatively that the patent be maintained in amended form on the basis of auxiliary request 1 or 2 as submitted with the reply to the appeal.

Reasons for the Decision

Auxiliary request 2

1. Article 12 RPBA

1.1 Contrary to the appellant's view, auxiliary request 2, which was filed with the respondent's reply to the

appeal, is to be taken into consideration in these proceedings. However, since this request is not allowable in substance, there is no need to provide further details in this regard.

2. Article 56 EPC

Patent in suit

2.1 The patent in suit relates to a method for forming aerobic granules in a stable manner, which granules can be used for biologically treating wastewater containing organic matter (paragraphs [0001], [0007] and [0015]).

Closest prior art

2.2 The respondent was of the view that E8 was not a suitable starting point for assessing inventive step because it did not concern the stable formation of aerobic granules; it took the view that another document was in fact the closest prior art.

However, E8 (all references being to the English translation thereof, E8a) is a pilot study examining the possibilities of aerobic granular sludge technology for the treatment of municipal wastewater (page 1, paragraph 1.2). It is concerned with, *inter alia*, the stability of granule formation (*ibid.*, first bullet point). Thus, E8 is indeed a suitable starting point for assessing inventive step. Moreover, in a case in which inventive step is denied in view of a piece of prior art, the choice of that prior art as the starting point for the assessment of inventive step needs no specific justification as the claimed invention must, as a general rule, be non-obvious having regard to any prior art (T 261/19, Reasons 2.5).

Disclosure of E8

- 2.3 E8 as a whole relates to *aerobic* granular sludge technology. The method for granule formation known from E8 (see section 2.2.2 beginning on page 3) involves repeating a cycle with
- an anaerobic filling phase (i.e. step) in which [municipal] wastewater, inherently containing organic matter, is contacted with granular sludge at the bottom of the reactor,
 - an aeration phase during which several biological processes take place,
 - a settling phase,
 - and a phase in which effluent is discharged.

It is furthermore described that the effluent discharge phase can be combined with the filling phase, such that the effluent is "pressed" from the top of the reactor (ibid.). This known method anticipates the cycle steps stipulated in the first paragraph of claim 1 at issue (features 1a-1g), leading to the required granule formation. The reactor is accordingly a semibatch reactor. In the reactor used, the filling and the effluent discharge can take place separately or at the same time (page 8, paragraph 2.4: "Pilot installation", and the figure on page 9). From the end of October 2004, i.e. including the relevant time period to which the measurements in Tables 7, 8 and 11 - considered below - relate, both steps (filling and emptying) were carried out simultaneously (page 17, paragraph 3.5), in accordance with features 1k-1m of claim 1 at issue.

Moreover, by repeating the cycle steps, a satiated state and a starved state are repeated. This, together with granules being formed, means that feature 1h3 is also realised in E8. The remainder of feature 1h3

merely relates to the mechanism of granule formation, which is implicit.

E8 furthermore discloses that, from January 2005 onwards, there was a more or less constant granular sludge concentration and the sludge production can be calculated on the basis of the amount discharged with the effluent and the drain (sludge withdrawal), see paragraph 4.6.3 on page 30. The sludge retention time (SRT) is not expressly disclosed as such in E8. As will be addressed below, the opponent argued that the SRT could be calculated from the operational parameters disclosed in E8.

E8 reports COD instead of BOD. It was common ground that COD could be converted into BOD, the conversion factor being dependent on the nature of the wastewater (see also E5, page 5, right-hand column, first full paragraph, and the patent in suit, paragraph [0061]). The disclosure in E8 that *"in order to keep the sludge load at the same level, more wastewater was fed and/or the aeration time is shortened"* (page 14, sentence above Table 2) and that the aeration step sets the COD load (Table 2) may therefore be regarded as "controlling" the BOD load relative to the sludge concentration MLSS and "adjusting" the reaction (i.e. aeration) time within the meaning of the claim. Adjusting the aeration time is also shown in Table 6 (page 22). E8 also reports values of kgCOD/(kgTS.d) based on the aerated phase (i.e. the aeration step duration), see Tables 7 and 8 (page 24). While these values correlate with "A" - the definition of "A" being provided in feature 1h1 - for a given wastewater, as indicated above, it is however unknown to which precise value of "A" these values correspond, the conversion

factor of COD to BOD applicable in this case being unknown.

According to the opponent, the SRT and A values could be derived from the data in E8 (Annex 2 of the statement of grounds of appeal). However, as explained by the opponent, an approximation of the proportion of COD broken down was made to calculate the SRT from the data in Table 11 of E8 (based on COD broken down) in combination with the data in Tables 7 and 8 (relating to COD introduced per day). The values of A likewise relied on an assumption as regards the COD:BOD conversion factor. In contrast to the appellant's view, a value that is derived from E8 by calculations involving an estimation or assumption cannot be seen to be directly and unambiguously disclosed in E8. This applies all the more to values obtained by performing an additional rounding step.

Even on the basis of the opponent's calculations of the SRT and "A" values (statement of grounds of appeal, Annex 2, Table A, page 46 of 47), none of the measuring points relates to the necessary *combination* of "A" with the SRT.

E8 consequently does not disclose the SRT of 10 to 15 days in conjunction with a value of A within the range of 0.1 to 0.16 (kg BOD/d)/kg MLSS, A being as defined in feature 1h1 of claim 1.

Technical problem

2.4 As also argued by the respondent, the patent in suit addresses the technical problem of providing a stable formation of sludge granules having good settling properties (paragraph [0007]).

Proposed solution

2.5 As the solution to this technical problem, the claimed method is proposed, in which the SRT is 10 to 15 days and the "A" value is in the range of 0.1 to 0.16 (kgBOD/d)/kgMLSS. As outlined above (point 2.3), no additional difference can be seen in "adjusting the reaction time", in contrast to the respondent's view.

Need to reformulate the technical problem

2.6 The technical problem indicated in the patent has already been solved in E8 (page 7, last sentence), on the basis of the same understanding as in the patent in suit that granules are those with a minimum diameter of 200 μm (paragraph 2.2.3 on page 5 of E8 and paragraph [0069] of the patent in suit).

2.7 It was debated whether it could be derived from the examples in the patent in suit that the claimed ranges of the "A" and SRT values led to any improvement with regard to the desired granule formation (point 2.4), as compared with E8.

It is not clear if the examples in the patent in suit actually fall within the scope of the claims at issue. In the examples, the introduction step and the discharge step are mentioned separately (paragraph [0095]) and there is no indication that these were carried out simultaneously. Moreover, the calculation of the parameter "A" in the examples is made on the basis of the formula in paragraph [0094], which differs from the definition of "A" in the claim and in the general description of the invention (paragraph [0008]) in that the BOD load is corrected for BOD leaving the reactor.

Furthermore, as argued by the appellant, it is common general knowledge that sludge age (i.e. the SRT) and "A" are inversely correlated in a given process (see E17b, page 138, Figure 4.8), relating to a given temperature and wastewater.

Even assuming in the respondent's favour that the examples demonstrate better sludge properties in "conditions 5" according to the claim than in conditions 4 and 6 which have a longer SRT or a higher value of "A", respectively, these examples concern the specific wastewater examined and relate to a specific temperature. There is, however, no basis to conclude that the same "A" range would be beneficial across the whole scope claimed, including lower SRTs than in conditions 5 (e.g. only 10 days) and relating to any type of wastewater and any temperature, the temperature varying with the geographic region and the season.

For these reasons, the technical problem must be reformulated in a less ambitious manner; it can merely be seen as the provision of an alternative.

Obviousness of the solution

2.8 Even though the precise values of "A" and the SRT in E8 are unknown, the appellant's calculations nevertheless reflect ranges of these values which are probable with municipal wastewater having a usual COD:BOD ratio of 2.0 to 2.5 (statement of grounds of appeal, Annex 2, Table A, page 46 of 47; see also E12, page 19, Table 1 for a usual COD:BOD ratio in municipal wastewater). It is evident from said Table A that several of these probable values of the SRT and "A" taken individually fall within the respective claimed range. In particular, the SRT in reactor 1 was between 11 and 13 days in July 2005, based on the reasonable assumption

that at most 85% of the incoming COD was broken down, and thus the SRT was within the claimed range. The corresponding value of A in that month was estimated to be within the range of 0.089 to 0.112, which at least overlaps with the claimed range. The skilled person starting from E8 and faced with the technical problem of providing an alternative would carry out the process with usual municipal wastewater and would thus readily adjust the operational parameters, in particular the SRT and the aeration time, such that SRT and "A" values within the claimed ranges would also result. Although the claimed combination of the SRT and "A" values is one possible alternative among many, a mere arbitrary choice made from the possible solutions cannot be regarded as involving an inventive step (T 939/92, Reasons 2.5.3).

- 2.9 For these reasons, the claimed method does not involve an inventive step. Auxiliary request 2 does not meet the requirements of Article 56 EPC.

Main request and auxiliary request 1

3. Article 56 EPC

- 3.1 Compared with auxiliary request 2, the claim of auxiliary request 1 specifies a broader range for the SRT (i.e. 5 to 25 days) and the claim of the main request specifies this broader range for the SRT and additionally a broader range for the "A" value (i.e. 0.05 to 0.25 (kgBOD/d)/kgMLSS).

Hence, the considerations set out under point 2. above also apply to these requests, and the main request and auxiliary request 1 lack an inventive step for the same

reasons as those set out with respect to auxiliary request 2.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chair:



C. Vodz

G. Glod

Decision electronically authenticated