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Datasheet for the decision of 5 July 2022

Case Number: T 1085/20 - 3.3.05

Application Number: 14735047.4

Publication Number: 3008165

IPC: C12N1/20, C12M1/34, C12P7/06

Language of the proceedings: EN

Title of invention:
CONTROL OF CONDUCTIVITY IN ANAEROBIC FERMENTATION

Patent Proprietor:
Jupeng Bio (HK) Limited

Opponent:
ArcelorMittal

Headword:
Fermentation/JUPENG

Relevant legal provisions:
EPC Art. 54(1), 54(2), 123(2)
RPBA 2020 Art. 12(2), 12(4), 12(6)

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It can be changed at any time and without notic

Keyword:
Novelty - main request (no) - implicit disclosure (yes)
Amendments - allowable (no)
Late-filed request - should have been submitted in first-instance proceedings (yes) - admitted (no)

Decisions cited:
G 0001/21, T 0131/03, T 1741/12

Catchword:

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Case Number: T 1085/20 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 5 July 2022

Appellant: (Patent Proprietor)	Jupeng Bio (HK) Limited 1/F Hing Lung Commercial Building 68-74 Bonham Strand Sheung, Wan Hong Kong (CN)
Representative:	King, Alex Mathisen & Macara LLP Communications House South Street Staines-upon-Thames, Middx TW18 4PR (GB)
Respondent: (Opponent)	ArcelorMittal 24-26, Boulevard d'Avranches 1160 Luxembourg (LU)
Representative:	Lavoix 2, place d'Estienne d'Orves 75441 Paris Cedex 09 (FR)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 20 February 2020 revoking European patent No. 3008165 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	E. Bendl
Members:	T. Burkhardt
	K. Kerber-Zubrzycka

Summary of Facts and Submissions

I. The patent proprietor's (appellant's) appeal lies from the opposition division's decision to revoke European patent 3 008 165 B1.

II. The opposition division concluded that then auxiliary request eight (claims as granted) did not meet the requirements of Article 54 EPC and that the other sets of claims under consideration went beyond the original disclosure.

III. The following documents were among those discussed at the opposition stage:

D2 WO 2012/015317 A1
D5 "Declaration" by B.D. Heijstra, dated 8 October 2019

IV. With its grounds of appeal, the appellant indicated that the claims as granted were its main request and additionally submitted nine auxiliary claim requests.

V. Independent claim 1 of the main request (patent as granted) reads as follows:

"1. A process for fermenting a CO-containing gaseous substrate comprising:

providing a CO-containing gaseous substrate to a fermentation medium and fermenting the CO-containing gaseous substrate by contacting with one or more acetogenic bacteria;

controlling medium conductivity during fermentation while providing a space time yield (STY) of 10 g ethanol/(L·day) or more, wherein the fermentation medium has a conductivity of 30 mS/cm or less; and

maintaining a conductivity to specific carbon uptake (SCU in mmole/minute/gram dry cells) relationship according to a formula where $SCU = SCU_{max} - F*conductivity$, wherein SCU_{max} up to 3 and F = 0.05 to 1."

VI. Independent claim 1 of the first auxiliary request additionally contains the following feature at the end:

"... wherein upon reaching a target cell density the cell density is maintained through cell recycle."

VII. Compared with the main request, independent claim 1 of the second auxiliary request additionally contains the following feature at the end:

"... and further wherein the CO-containing substrate provided to the fermentor has an H2 to CO molar ratio of 0.2 or more."

VIII. Compared with the main request, independent claim 1 of the third auxiliary request additionally contains the following feature at the end:

"... wherein upon reaching a target cell density the cell density is maintained through cell recycle in which liquid effluent from the reactor is sent to a cell separator where cells and permeate are separated, and cells are sent back to the reactor."

IX. Compared with the main request, the maximum conductivity of the fermentation medium is further limited to "25 mS/cm or less" in independent claim 1 of the fourth auxiliary request.

X. Independent claim 1 of the fifth auxiliary request combines the modifications of the first and fourth auxiliary requests.

XI. Independent claim 1 of the sixth auxiliary request combines the modifications of the second and fourth auxiliary requests.

XII. Independent claim 1 of the seventh auxiliary request combines the modifications of the third and fourth auxiliary requests.

XIII. Compared with the main request, independent claim 1 of the eighth auxiliary request additionally contains the following feature at the end:

"... said process providing a target cell density of 3 to 30 g/L, wherein the cell density is maintained through cell recycle."

XIV. Compared with the main request, independent claim 1 of the ninth auxiliary request additionally contains the following feature at the end:

"... said process providing a target cell density of 3 to 30 g/L wherein the cell density is maintained through cell recycle in which liquid effluent from the reactor is sent to a cell separator where cells and permeate are separated, and cells are sent back to the reactor."

XV. With its reply to the statement setting out the grounds of appeal, the opponent (respondent) further submitted the following document:

D6 "Second declaration" by B.D. Heijstra, dated 16 October 2020

XVI. The appellant's arguments at the appeal stage relevant to the present decision can be summarised as follows.

The oral proceedings before the board was not to be held as a videoconference but as an in-person hearing.

The second declaration D6 was not to be admitted.

The claims as granted fulfilled the requirements of Article 54 EPC, in particular in view of D2.

The first, second, fourth, fifth, sixth and eighth auxiliary requests were direct reactions to issues under Articles 123(2) and 54 EPC raised in the decision under appeal and were thus to be admitted.

The third, seventh and ninth auxiliary requests fulfilled the requirements of Article 123(2) EPC.

XVII. The respondent's arguments at the appeal stage are reflected in the reasons below.

XVIII. The appellant requests that the decision under appeal be set aside and that the patent be maintained as granted. It alternatively requests that the patent be maintained as amended on the basis of one of nine auxiliary requests submitted with the statement setting out the grounds of appeal.

The respondent requests that the appeal be dismissed.

Reasons for the Decision

1. Format of the hearing

1.1 While the respondent requested that the oral proceedings be held as a videoconference, the appellant requested that the oral proceedings take place in person.

1.2 For the following reasons, the oral proceedings were held as a videoconference.

- At the time of the oral proceedings, the number of confirmed COVID-19 cases in Germany, but also in France and to a lesser degree in the United Kingdom, was still high. Access restrictions to EPO buildings were still in force.

Hence, there was still a general emergency impairing the parties' possibilities to attend in-person oral proceedings. Under these circumstances, oral proceedings in the form of a videoconference could be held even if not all the parties had given their consent (G 1/21, point 49 of the Reasons, Order).

- The appellant argued that the "issues to be discussed [were] complicated and would merit discussion in person", yet without explaining in more detail why the complexity of the case was such that a videoconference was not suited. The board could not identify such a reason either.

- The respondent indicated that it would be represented by a single person at the oral proceedings. Thus, the appellant's argument that it would be "difficult to know who [was] speaking" was not convincing either.

- The appellant moreover argued that the respondent's request to hold the oral proceedings as a videoconference was late filed. However, the request was made more than one month before the scheduled date. In view of the dynamic nature of the pandemic, it appears to have been filed in reasonable time.

2. Consideration of the second declaration D6

2.1 The respondent submitted the second declaration D6 with its reply to the statement setting out the grounds of appeal. This document aims at corroborating the findings of the first declaration D5, which was submitted at the opposition stage.

Both declarations are signed by one of the inventors of D2 and present attempts at reproducing Example 1B of D2 to prove that this example inherently fulfils the criteria of claim 1 as granted also for:
- conductivity
- the coefficients SCU_{max} and F of the relationship between the specific carbon uptake (SCU) and conductivity

2.2 The appellant requests that D6 not be admitted. In its view, the respondent acted in bad faith when submitting D5 with insufficient information on the experiments carried out in a way that was not representative of Example 1B of D2. The respondent should have submitted

D6 during the first-instance proceedings, e.g. in place of or in addition to D5.

Like D5, D6 was not relevant in the appellant's view since it gave only sparse information on how the experiments were carried out and since there were major differences:
- between D6 and Example 1B of D2
- between D6 and D5

Therefore, the results of D6 were not representative of Example 1B of D2 either.

2.3 The appellant's arguments are, however, not convincing.

As to the chronology of events, the respondent indicated in response to the summons to oral proceedings at the opposition stage (two months before the oral proceedings and still within the time limit of Rule 116 EPC) the principal experimental results that would later be filed as D5. Thus, prior to filing D5, the respondent reported on, *inter alia*, the strain of bacteria used, the temperature, the ethanol/acetate productions, the amount of biomass, the conductivity, values of SCU_{max} and F as well as the fact that a "similar pH" to in D2 was applied.

The respondent subsequently confirmed these data by submitting the first declaration D5. While this submission occurred after the time limit of Rule 116 EPC, it was still seven weeks before the oral proceedings.

The appellant subsequently submitted the eighth auxiliary request (the patent as granted) three days before the oral proceedings to react to objections

under Articles 123(2) and 84 EPC but did not comment on D5. The appellant did so only at the oral proceedings when it raised objections against the results of D5.

The opposition division nevertheless considered D5 and partly based its finding of lack of novelty of the subject-matter of claim 1 of the eighth auxiliary request on this document (see point 4.4.3 of the decision under appeal).

The reply to the statement setting out the grounds of appeal was thus the first occasion for the respondent to react to the objections raised by the appellant against D5 at the oral proceedings. The submission of D6 with the reply to the statement setting out the grounds of appeal was therefore a timely reaction.

2.4 Moreover, D6 corroborates the results of D5. Indeed, while the respondent indicated that the conditions applied in D5 were merely "similar" to those of Example 1B of D2 (which was criticised by the appellant at the oral proceedings at the opposition stage), the conditions in D6 were allegedly "identical" to them. D6 is therefore directed to an objection on which the decision under appeal is based (Article 12(2) RPBA 2020).

As is shown below, D6 moreover proves that Example 1B of D2 inherently fulfils the criteria of claim 1 for conductivity and the relationship between SCU and conductivity (see points 3.3 to 3.5 below).

No bad faith can therefore be identified.

2.5 Consequently, the second declaration D6 is admitted (Article 12(4) RPBA 2020).

Main request

The main request corresponds to the patent as granted and to the eighth auxiliary request underlying the decision under appeal.

For the reasons set out below, the main request does not fulfil the requirements of Article 54(1) and (2) EPC.

3. Article 54 EPC

3.1 The opposition division concluded that the subject-matter of claim 1 lacked novelty in view of Example 1B of D2. While this example did not explicitly disclose a conductivity and thus the relationship according to the formula of claim 1 could not be verified either, D5 showed, in the view of the opposition division, that, under experimental conditions "similar" to those of D2, Example 1B of D2 inherently reflected the claimed conductivity and the relationship between SCU and conductivity. The appellant had provided no counter-evidence in this regard (see point 4.4.3 of the Reasons of the decision under appeal).

3.2 In the appellant's view, the opposition division's conclusion was wrong. Example 1B of D2 disclosed neither a conductivity of 30 mS/cm or less, the maintenance of the relationship between the SCU and conductivity nor a constantly high ethanol space-time yield (STY) of 10 g ethanol/l/day or more. D2 did not disclose an active control of the conductivity either.

D6 was not sufficient to fill these gaps because it was not representative of Example 1B of D2.

Since D5 and D6 were flawed, it was not necessary for the appellant to carry out its own experiments.

3.3 The board does not share this view.

The ethanol STY of 26.14 g/l on the second day of Example 1B of D2 (Table 2) is significantly higher than 10 g/l/day as required by claim 1 of the main request. This was not disputed. Also, claim 1 does not specify a minimum duration during which the required production has to be achieved.

The expression "controlling medium conductivity" in claim 1 is also anticipated since, as is shown below, Example 1B of D2 results in a conductivity clearly below 30 mS/cm. Even according to the patent in suit (paragraph [0039]), "controlling" encompasses the use of suitable media which provide a low conductivity.

D6 uses the same Clostridium autoethanogenum DSM 23693 strain as Example 1B of D2. Like the example of D2, D6 discloses a batch process with high ethanol production on the second day (19.42 g/l/d) and confirms that the conductivity under these circumstances is between 8.7 and 17.5 mS/cm, thus well below the claimed upper limit of 30 mS/cm. The values of SCU_{max} (2.2256) and F (0.0781) of the relationship between SCU and conductivity as determined by linear regression (in line with Figure 31 of the patent in suit) also plainly fall within the claimed ranges.

On the other hand, there are indeed several differences:

- between D6 and Example 1B of D2
- between D6 and D5

(i) Thus, the conductivities obtained in D5 and D6 vary quite significantly (2.256 and 1.988 mS/cm in D5 vs. 8.7 to 17.5 mS/cm in D6). According to the appellant, the conductivity moreover varies significantly over time.

However, all the values measured in D5 and D6 are clearly below the upper limit of 30 mS/cm of claim 1. Furthermore, just as for the ethanol production, claim 1 does not specify a minimum duration during which the conductivity has to remain below 30 mS/cm.

(ii) The pH of 5 in D6 is not identical to the value of 5.3 in Example 1B of D2, which was adjusted by adding NH_4OH (page 26, line 7).

In the appellant's view, such a different pH was likely to have a significant impact on the nutrients and the solubility of any metals present and in turn on conductivity and carbon uptake.

There is, however, no counter-evidence on file proving that this causes one of the parameters of claim 1 to be outside the claimed ranges.

(iii) While the results of Example 1B of D2 were collected over two days, this was done over three days in D6. Moreover, the acetate production and the amount of biomass in D6 and D2 were different.

What happened on day 3 of the experiments of D6 is indeed irrelevant for assessing novelty since experiment 1B of D2 only lasted two days. It is also

true that the differences mentioned above show that the experiments of D6 are not a perfect reproduction of Example 1B of D2.

However, it is normal that experiments have a certain variability, and all the values obtained in D6 clearly fall within the claimed ranges.

3.4 In view of these facts, the board has no doubt that the unusual parameters conductivity and coefficients of the linear relationship between SCU and conductivity - at least in the context of fermentation - are inherently disclosed in Example 1B of D2 (see, for example, T 131/03, keyword).

The appellant, which had known about the respondent's allegation since two months before the oral proceedings at the opposition stage, nevertheless chose to not submit any experimental counter-evidence, neither at the opposition stage nor at the appeal stage.

3.5 Consequently, Example 1B of D2 anticipates the subject-matter of claim 1 of the main request (Article 54(1) and (2) EPC).

Third, seventh and ninth auxiliary requests

4. Article 123(2) EPC

4.1 The appellant indicated that the features "reaching [of] a target cell density", "cell recycle" and "cell separator" added to claim 1 were taken from the passage on page 11, lines 20 to 24 as originally filed.

4.2 The opposition division concluded that these requests did not fulfil the requirements of Article 123(2) EPC, notably since the features of claim 1 were taken from different embodiments not directly and unambiguously disclosed in combination.

4.3 For the reasons set out below, this is indeed the case.

The application as originally filed is directed to three distinct and independent embodiments, i.e. processes for obtaining a high ethanol STY in three different ways (page 1, lines 25 to 29):

- a first process: "maintaining a conductivity to specific carbon uptake ... relationship according to a formula where SCU = SCU_{max} - F*conductivity" (page 1, line 30 to page 2, line 2; independent claim 1)

- a second process: "maintaining a conductivity (y) to specific gas feed rate (x) ... until reaching a target cell density" followed by "maintaining a cell density above a target cell density and maintaining a conductivity" (page 2, lines 3 to 10; independent claim 8)

- a third process: "chloride ions in the fermentation medium are substituted" with other ions (page 2, lines 11 to 18; independent claim 15)

In the description as originally filed, in particular pages 10 and 11, it is not always clear which passages are of a general nature and which refer to specific embodiments, in particular because of the frequent use of expressions such as "in one aspect" or "in another aspect" (for example, on page 10, lines 24 and 33 and on page 11, line 7).

While the passage on page 10, lines 24 to 32 refers to the relationship between SCU and conductivity, and thus to the first process, the subsequent passage starting on line 33 refers to the second process since it involves the "specific gas feed rate (x)" (although the formula in the last line of page 10 is not identical to that of claim 8 as originally filed) and the "reaching [of] a target cell density". Consistent with this, the relationship between SCU and conductivity is not mentioned in the passage from page 10, line 33 to page 11, line 29.

4.4 It can thus not be directly and unambiguously derived that the features "reaching [of] a target cell density", "cell recycle" and "cell separator" of page 11, lines 20 to 24 are disclosed:
- *in combination* with the first process
- in isolation from other features specific to the second process, such as the relationship with the "specific gas feed rate (x)"

Moreover, claim 8 and the passage on page 10, line 33 to page 11, line 1 as originally filed make it clear that the specific gas feed rate (x) directly influences the prevailing cell density and that these features are inextricably linked to each other.

4.5 In the appellant's view, the term "aspect" in the application as originally filed merely designates preferred features.

This argument is not convincing since, in this event, there would be no reason for:
- a description with the three distinct and independent processes

- the presence of three independent method claims, which correspond to these three processes

4.6 Hence, the third, seventh and ninth auxiliary requests do not fulfil the requirements of Article 123(2) EPC.

First, second, fourth, fifth, sixth and eighth auxiliary requests

The appellant submitted these auxiliary requests for the first time with the statement setting out the grounds of appeal. This was uncontested.

5. Consideration/admissibility of the auxiliary requests

5.1 The respondent requests that these auxiliary requests not be admitted.

For the reasons set out below, these requests are not considered (Article 12(6) RPBA 2020).

5.2 The appellant argues that the submission of these auxiliary requests was triggered by the opposition division's surprising findings in the decision under appeal that:
- the then main request and first to seventh auxiliary requests do not meet the requirements of Article 123(2) EPC
- the then eighth auxiliary request (patent as granted, current main request) does not meet the requirements of Article 54 EPC over D2, while such an objection had not been raised in the summons

The appellant moreover argues that these requests should also be considered for reasons of equal treatment of the parties if D6 is considered.

5.3 Regarding Article 123(2) EPC, as early as in the summons to oral proceedings, the opposition division indicated that the feature relating to the "target cell density" in claim 1 instead related to the embodiments of claims 8 and 15 as originally filed (i.e. to the second and third processes mentioned above under point 4.3) and that, consequently, neither the main request nor the auxiliary requests then on file met the requirements of Article 123(2) EPC.

In response to these summons, the appellant submitted a new main request and seven auxiliary requests.

However, in a letter dated 27 September 2019, the respondent indicated that the objection under Article 123(2) EPC also applied to all these new requests.

In response, the appellant submitted the eighth auxiliary request (claims as granted) to overcome the issue of "added matter", among others.

The appellant was thus aware of the objection against the feature "target cell density" under Article 123(2) EPC well before the decision under appeal was issued.

5.4 Regarding Article 54 EPC, it is true that the summons to oral proceedings at the opposition stage do not cite D2 under Article 54 EPC.

This is, however, logical since the claims as granted (then auxiliary request 8, current main request) were not pending at this point (the then pending requests

were narrower). Moreover, experimental results D5 had not yet been submitted.

In the summons, the opposition division indicated that D2 failed to disclose, among other things, values of conductivity (and thus also the claimed relationship between SCU and conductivity). In addition, the opposition division indicated two further distinguishing features, namely (ii) the H_2/CO molar ratio and (iii) the maintenance of the cell density, since at this point in time, the independent claim additionally comprised these features. Consequently, these findings were listed under Article 56 EPC and not under Article 54 EPC.

Subsequent to the summons and two months before the oral proceedings at the opposition stage, the respondent indicated that additional tests had been carried out proving that the conductivity in Example 1B of D2 was 30 mS/cm or less and that the relationship between SCU and conductivity of claim 1 of the patent in suit was also fulfilled. Again, since the claims then on file were narrower, the respondent raised an objection under Article 56 EPC.

Two weeks later, yet still seven weeks before the oral proceedings, the appellant submitted declaration D5 to confirm these findings.

The appellant did react to the respondent's submissions, i.e. by re-submitting the (broader) claims as granted three days before the oral proceedings (as the then eighth auxiliary request).

5.5 This proves that the appellant must have known about the facts and arguments underlying the decision under

appeal in advance and that it had sufficient time to react.

In accordance with established case law, the "parties in *inter partes* cases are subject to a particular duty to facilitate due and swift conduct of the proceedings, in particular by submitting all relevant facts, evidence, arguments and requests as early and completely as possible" (Case Law of the Boards of Appeal, 9th edn., 2019, IV.C.4.3).

Therefore, the appellant could and should have filed the first, second, fourth, fifth, sixth and eighth auxiliary requests at the opposition stage, e.g. when it submitted the then eighth auxiliary request, even if the appellant considered the results of D5 unconvincing. By contrast, the appellant indicated at the end of the oral proceedings at the opposition stage that it would not submit further requests (point 8.8 of the minutes).

To do so only at the appeal stage is detrimental to the need for procedural economy (Article 12(4) RPBA 2020) and contrary to the primary objective of the appeal proceedings, which is to review the decision under appeal in a judicial manner (Article 12(2) RPBA 2020).

5.6 There is also no reason for admitting these auxiliary requests for reasons of equal treatment of the parties after the admission of document D6.

The admissibility of the auxiliary requests and D6 are independent of each other. A comparison of the reasons given under points 2. and 5. above moreover shows that the circumstances are different. For example, while D6 was submitted at the earliest point after the appellant

had raised its objections against D5 (point 2.3 above), the appellant waited until the appeal stage before submitting the auxiliary requests (see point 5.2 to 5.5). This is contrary to the requirement of due process.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated