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Datasheet for the decision of20 February 2013

Case Number: T 1735/09 - 3.3.10

Application Number: 01308283.9

Publication Number: 1201630

IPC: C07C5/48, C07C51/215, C07C51/25, C07C53/08, C07C67/05, C07C69/01, C07C69/003

Language of the proceedings: EN

Title of invention:
Oxidation process for the production of alkenes and carboxylic acids

Patent Proprietor:
BP Chemicals Limited

Opponent:
Celanese International Corporation

Headword:

Relevant legal provisions:
EPC Art. 54(2)

Keyword:
Novelty - no, all requests

Decisions cited:
T871/08

Catchword:

Beschwerdekammern
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Case Number: T 1735/09 - 3.3.10

D E C I S I O N
of the Technical Board of Appeal 3.3.10
of20 February 2013

Appellant: (Patent Proprietor)	BP Chemicals Limited Chertsey Road Sunbury-on-Thames, Middlesex TW16 7BP (GB)
Representative:	Brooke, Caron BP International Limited Patents & Agreements Chertsey Road Sunbury-on-Thames, Middlesex TW16 7LN (GB)
Respondent: (Opponent)	Celanese International Corporation 1601 West LBJ Freeway Dallas, Texas 75234 (US)
Representative:	Kirsch, Susan Edith Carpmaels & Ransford One Southampton Row London WC1B 5HA (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted 26 June 2009 revoking European patent No. 1201630 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman: P. Gryczka
Members: R. Pérez Carlón
C. Schmidt

Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division to revoke European patent No. 1 201 630.

II. An opposition had been filed on the grounds of lack of novelty and inventive step (Article 100(a) EPC).

III. *Inter alia*, the following document had been cited during opposition proceedings:

D5: EP 1 043 064

IV. Claim 1 of the main request, filed with the statement of grounds of appeal, and of auxiliary requests 1 and 2, filed under cover of a letter dated 24 January 2013 reads as follows:

"A process for the oxidation of a C_2 to C_4 alkane to produce the corresponding alkene and carboxylic acid which process comprises contacting in an oxidation reaction zone, said alkane, molecular oxygen-containing gas, and the corresponding alkene and water, in the presence of at least one catalyst active for the oxidation of the alkane to the corresponding alkene and carboxylic acid, to produce a product stream comprising alkene, carboxylic acid and water, wherein in said process the molar ratio of alkene to carboxylic acid produced in said oxidation reaction zone is adjusted or maintained at a pre-determined value by controlling the concentrations of the alkene and water in said oxidation reaction zone and optionally by also controlling one or more of the pressure, temperature and residence time of the oxidation reaction zone and in which the alkane is ethane, the corresponding alkene is ethylene, the corresponding carboxylic acid is

acetic acid and wherein ethylene and water are fed into the oxidation reaction zone in a ratio or 1 to 0.1 - 10 by weight, the molar ratio of ethylene to acetic acid produced is in the range 0.8 : 1 to 1.4 :1 and the product stream from the oxidation reaction zone also comprises carbon oxides in an amount of less than 15 mol%."

V. In a communication under Article 15(1) EPC, the board informed *inter alia* the parties that example 3 of document D5 appeared to disclose all the features of claim 1, which would thus lack novelty.

VI. The appellant (patent proprietor) argued that example 3 of D5 failed to disclose the step of controlling the concentrations of the alkene and water in said oxidation reaction zone, since D5 only taught maintaining the composition and the operating conditions constant, which was different from a positive step aiming at controlling. Document D5 did not maintain the amount of final product at a determined value over time and only disclosed average compositions of the product feed.

VII. The respondent (opponent) considered that the patent in suit exerted control of the process in exactly the same way as example 3 of D5, which the consequence that the subject-matter of claim 1 was not novel.

VIII. Under cover of a letter dated 24 January 2013, the appellant withdrew its request for oral proceedings and invited the board to reach a decision on the basis of the written record.

IX. Under cover of a letter dated 6 February 2013, the respondent confirmed that it requested oral proceedings

only in the event the board was unable to dismiss the appeal on the basis of the written record.

X. The board cancelled the oral proceedings.

XI. The final requests of the parties were as follows:

- The appellant requested that the decision be set aside and the patent maintained upon the basis of the main request, filed under cover of a letter dated 4 November 2009, or upon the basis of one of the auxiliary requests 1 and 2 filed under cover of a letter dated 24 January 2013.
- The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

Added subject-matter, Article 123(2) EPC:

2. Since the board arrived to the conclusion that the subject-matter of none of the request on file was novel, it is not necessary to further investigate whether these requests include added subject-matter.

Novelty, Article 54(2) EPC:

Main request (claim 1):

3. It has not been challenged by the appellant that example 3 of document D5 (EP A 1 043 064) discloses a process for the oxidation of ethane to a mixture of ethene and acetic acid over a catalyst containing Mo, V, Nb and Au (see paragraph [35]) wherein ethylene and

water are fed to the reaction zone in a relative ratio of 1:2 by weight (page 5, lines 18-19; 5% v/v ethylene and 10% v/v water). The molar ratio of ethylene to acetic acid obtained is 1.42:1 (results from dividing the selectivity of ethylene, 55.8 mol% by the selectivity of AcOH, 39.3 mol% as disclosed in table 2 of D5), and hence falls within the claimed range, since 1.42 shall read 1.4 when rounded to a significant figure less (see decision T871/08, point 2.3 of the reasons, not published in the Official Journal of the EPO). The amount of carbon oxides in the product stream is 4.8 mol%, and thus less than 15 mol% as required by claim 1.

4. The parties were, however, divided as to whether example 3 of document D5 disclosed the feature "wherein in said process the molar ratio of alkene to carboxylic acid produced in said oxidation reaction zone is adjusted or maintained at a predetermined value by controlling the concentrations of the alkene and water in said oxidation reaction zone" required by claim 1 of the patent in suit.

5. In relation with this feature, the patent in suit mentions that: *"The molar ratio of alkene to carboxylic acid may then be adjusted by controlling the concentrations of the alkene and, optionally, water in the total combined feed to the oxidation zone"* (see paragraph [15]).

The examples of the patent in suit merely describe that the required inlet composition must be ensured (see paragraph [96]) in order to control the composition of the product feed.

In example 3 of D5 (paragraph [42]), both the

composition of the inlet feed (52% ethane, 5% ethylene and 10% water) and the flow rate are maintained over time after 30 minutes of equilibration (paragraph [43]). These steps amount to ensuring the required inlet compositions (cf. paragraphs [96] and [15] of the patent in suit) and therefore to controlling the concentrations of alkene and water in the reaction zone in the same manner as in the patent in suit.

6. It remains to be examined whether D5 discloses controlling the concentrations in the feed in order to maintain a predetermined value of alkene to carboxylic acid.

On page 3, paragraph [23], document D5 discloses that it seeks to obtain a mixture of AcOH and ethylene which could be directly used in the obtention of vinyl acetate. Therefore, the control of the amount of reagents in the feed is carried out in order to obtain the desired ratio of products, namely close to stoichiometric.

Document D5, hence, implicitly discloses the feature "wherein in said process the molar ratio of alkene to carboxylic acid produced in said oxidation reaction zone is adjusted or maintained at a pre-determined value by controlling the concentration of the alkene and water in said oxidation reaction zone", because it carries out said adjustment by using the same technical steps as in the patent in suit, namely controlling the composition of the feed and the reaction conditions.

Example 3 of document D5 discloses, therefore, all the features of claim 1 of the main request.

7. The appellant has argued that using a fixed feed composition and constant operating conditions was different from taking positive steps so as to maintain the ratio of alkene to acetic acid produced at a specific value.

It is not disputed that the wording "control" does not appear in document D5. However, since the process disclosed in D5 is carried out with the same technical steps as the process of the patent in suit, said control is implicitly disclosed therein.

This argument must, therefore, be rejected.

8. The appellant has further argued that D5 did not take into consideration the changes in the ratio of ethylene to acetic acid over time, whereas claim 1 of the patent in suit requires that the reaction was controlled so as to maintain the ratio of ethylene to acetic acid produced at a specific value.

However, claim 1 only requires that the molar ratio of alkene to carboxylic acid is adjusted, and not that said adjustment is maintained over time.

This argument must, therefore, be rejected.

9. The appellant has argued that example 3 of D5 only disclosed the average product ratio obtained, and did not reflect the changes in the composition of the final product with time.

However, claim 1 only requires that the amounts produced be adjusted and, hence, also includes adjusting the average amounts obtained.

This argument of the appellant must also fail.

10. For these reasons, it is concluded that the subject-matter of claim 1 of the main request is not novel under Article 54(2) EPC.

Auxiliary requests 1 and 2:

11. Claim 1 of auxiliary requests 1 and 2 is identical to claim 1 of the main request, and its subject-matter is therefore not novel for the same reasons as the later.

12. None of the requests on file is thus allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Rodríguez Rodríguez P. Gryczka

Decision electronically authenticated