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**Datasheet for the decision  
of 27 May 2021**

**Case Number:** T 0826/19 - 3.3.10

**Application Number:** 09818338.7

**Publication Number:** 2331485

**IPC:** C07C2/00, B01J29/00, C07C2/66

**Language of the proceedings:** EN

**Title of invention:**  
PROCESS FOR ETHYLBENZENE PRODUCTION

**Patent Proprietor:**  
Fina Technology, Inc.

**Opponent:**  
ExxonMobil Chemical Patents Inc.

**Headword:**

**Relevant legal provisions:**  
EPC Art. 100(c), 123(2)

**Keyword:**  
Amendments - allowable (no)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**

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**Chambres de recours**

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Case Number: T 0826/19 - 3.3.10

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.10**  
**of 27 May 2021**

**Appellant:** Fina Technology, Inc.  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 9 January 2019  
revoking European patent No. 2331485 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chair** P. Gryczka  
**Members:** R. Pérez Carlón  
T. Bokor

## Summary of Facts and Submissions

- I. The appellant (patent proprietor) lodged an appeal against the decision of the opposition division revoking European patent No. 2 331 485.
- II. Notice of opposition had been filed on grounds including that of added subject-matter (Article 100(c) EPC).
- III. Claim 1 of the patent as granted, which corresponds to the appellant's main request in these appeal proceedings, reads as follows:

*"A method of producing an alkylaromatic by the alkylation of an aromatic with an alkylating agent, the method comprising:*

- *providing at least one reaction zone containing a H-beta zeolite catalyst, wherein the at least one reaction zone comprises at least one preliminary alkylation reactor and at least one primary alkylation reactor downstream of the preliminary alkylation reactor, wherein the H-beta zeolite catalyst is contained in the preliminary alkylation reactor and a catalyst other than the H-beta zeolite catalyst is contained in the primary alkylation reactor;*
- *introducing a feed stream comprising an aromatic and an alkylating agent to the reaction zone, wherein the feed stream further includes catalyst poisons, which are nitrogen compounds; and*
- *reacting at least a portion of the aromatic under alkylation conditions to produce an alkylaromatic."*

- IV. The opposition division concluded that claim 1 of the patent as granted contained added subject-matter, for reasons including that the application as originally filed did not provide a basis for the required combination of catalysts. The objection applied in the same manner to all the auxiliary requests before it.
- V. With its statement of grounds of appeal, the appellant filed its main request, corresponding to the claims as granted, and auxiliary requests 1 to 14. Auxiliary request 8 corresponds to auxiliary request 4 before the opposition division.

Claim 1 of each of auxiliary requests 1 to 4 in these appeal proceedings is identical to claim 1 of the patent as granted.

Claim 1 of auxiliary request 5 requires the feed stream to contain *"impurities such as acetonitrile, ammonia and/or amine compounds in quantities that range from 20 ppb to 40ppb"*.

Claim 1 of auxiliary request 6 has the features of claim 1 of auxiliary request 5 and further limits the amount of H-beta catalyst in the preliminary alkylation system to *"between 1360 kg and 22,700 kg"*.

Claim 1 of auxiliary request 7 has all the features of claim 1 of auxiliary request 6 and further requires that *"the aromatic is benzene and the alkylating agent is ethylene, wherein the benzene:ethylene molar ratio is ranging from between 15:1 to 20:1"*.

Claim 1 of auxiliary request 8 has all the features of claim 1 of the main request and requires the nitrogen compounds to be *"selected from acetonitrile, ammonia"*

*and/or amine compounds".*

Claim 1 of each of auxiliary requests 9 to 11 have the features of claim 1 of the patent as granted, with the exception of *"wherein the feed stream further includes catalyst poisons, which are nitrogen compounds"*.

Claim 1 of auxiliary request 12 has the features of claim 1 of each of auxiliary requests 9 to 11 and requires, in addition, that the feed stream includes *"from 20ppb to 40ppb of catalyst poisons"*.

Claim 1 of auxiliary request 13 has the features of claim 1 of auxiliary request 12 and, in addition, requires the amount of H-beta catalyst in the preliminary alkylation system to be *"between 1360 kg and 22,700 kg"*.

Claim 1 of auxiliary request 14 has the features of claim 1 of auxiliary request 13, and further requires that *"the aromatic is benzene and the alkylating agent is ethylene, wherein the benzene:ethylene molar ratio is ranging from between 15:1 to 20:1"*.

VI. With a letter dated 4 December 2020, the appellant filed auxiliary request 15. Claim 1 of this request has the features of claim 1 of the main request and further requires that *"the aromatic is benzene and the alkylating agent is ethylene, wherein the benzene:ethylene molar ratio is ranging from between 15:1 to 20:1"*.

VII. The arguments of the appellant relevant to the present decision were as follows.

The features of claim 1 of the patent as granted found

the required basis in the application as originally filed. The definition of the catalysts contained in the preliminary and primary alkylation systems required by claim 1 could be found, almost word for word, in paragraph [0064]. Paragraph [0064] described the sole example of the application, which included further limitations. However, a generalisation to the features of claim 1 was allowable.

The appellant acknowledged that the definition of the catalyst in the primary alkylation reactor was unchanged in claim 1 of all the auxiliary requests on file. The arguments with respect to the support of the amendments thus applied analogously to all the requests on file.

VIII. The arguments of the respondent (opponent) relevant to the present decision were as follows.

The features of claim 1 did not find the required basis in the application as originally filed. Paragraph [0064] described the sole example of the application as filed. This example disclosed further limitations in combination with the nature of the catalyst, such as the type of catalyst in the preliminary reactor (Zeolyst CP 787 Zeolite H-Beta Strudate), the reactants (benzene, ethylene), their relative amount, the specific mode of addition (part of the ethylene added to the preliminary and part to the primary reactor), and the presence of specific impurities. None of them were required by claim 1. For this reason, paragraph [0064] failed to provide a basis for the features of claim 1. The ground in Article 100(c) EPC thus precluded the maintenance of the patent as granted. The catalysts in the preliminary and primary reactors were unmodified in claim 1 of all the auxiliary requests. A

negative conclusion on added subject-matter with respect to that feature of claim 1 of the main request should thus apply in the same manner to all the auxiliary requests.

IX. Oral proceedings before the board of appeal took place on 27 May 2021.

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

- The appellant requested that the decision under appeal be set aside and the case be remitted to the opposition division for further prosecution on the basis of the claims as granted (main request), or on the basis of one of auxiliary requests 1 to 15, auxiliary requests 1 to 14 as filed with the grounds of appeal dated 16 May 2019, auxiliary request 15 filed with the letter dated 4 December 2020.
- The respondent requested that the appeal be dismissed. It also requested that auxiliary requests 1 to 7 and 9 to 15 not be admitted into the proceedings.

XI. At the end of the oral proceedings, the decision was announced.

### **Reasons for the Decision**

1. The appeal is admissible.

#### Amendments

2. Claim 1 of the patent as granted, which is the appellant's main request, relates to a method of



producing an alkylaromatic by alkylation. The reaction zone comprises at least one preliminary alkylation reactor and at least one primary alkylation reactor. An H-beta zeolite catalyst is contained in the former; a catalyst other than the H-beta zeolite is contained in the latter.

The definition of the catalysts required by claim 1 of the patent as granted is not a feature of claim 1 as originally filed.

3. Claim 1 of the patent as granted requires the primary alkylation reactor to contain a catalyst "other than" the H-beta zeolite in the preliminary reactor.

Claim 1 contemplates that the preliminary alkylation reactor can contain further catalysts other than an H-beta zeolite. This embodiment, named "mixed catalyst", is disclosed in various passages, such as paragraph [0012] of the patent which corresponds to [0010] of the application as originally filed.

Claim 1 also relates to the embodiment in which both the preliminary and the primary reactor contain the same "mixed catalyst". Paragraph [0019], lines 7 to 9, of the application as originally filed discloses such embodiment, in the broader context of preliminary and primary reaction systems instead of reactors.

Thus, the requirement that the primary alkylation reactor contains a catalyst other than the H-beta zeolite contained in the preliminary alkylation reactor does not necessarily imply that these catalysts are different.

This was not disputed.

4. The appellant argued that paragraph [0064] of the application as originally filed provided a basis for the definition of the catalysts in the preliminary and in the primary alkylation reactors required by claim 1.

Paragraph [0064] is the introductory passage of the sole example of the application. The wording of paragraph [0064] with respect to the primary alkylation system is close to that in claim 1. The context, however, is not equivalent. The example discloses a process requiring a preliminary reactor containing Zeolyst CP 787 Zeolite H-Beta Extrudate, and a primary alkylation reactor having a catalyst which is not an H-beta zeolite, for the reasons that follow.

- 4.1 The feature "preliminary alkylation system having a single reactor loaded with ... H-beta zeolite catalyst", in the context of the example, is understood by the skilled reader as disclosing a reactor containing an H-beta zeolite catalyst only.

The exact nature of the catalyst in the preliminary alkylation reactor is commercially available Zeolyst CP 787 Zeolite H-Beta Extrudate, as disclosed in [0065]. No other catalyst or support is disclosed.

The skilled reader thus concludes that the preliminary alkylation reactor contains this specific zeolite and nothing else.

In contrast, claim 1 is not limited to requiring the catalyst in the preliminary alkylation reactor to be H-beta zeolite only, let alone to be the specific zeolite of the example of the patent application. For this reason alone, paragraph [0064] of the application as originally filed does not provide the

required basis for the features of claim 1.

- 4.2 Paragraph [0064] continues by disclosing that "the process further comprises a primary alkylation system after the preliminary alkylation system that contains catalyst other than the H-beta zeolite catalyst".

The reader of the example is left in the dark about the specific nature of the catalyst in the primary alkylation system. However, paragraph [0064] discloses that the primary alkylation system does not contain H-beta zeolite. It contains something else.

Paragraph [0064] thus discloses a catalyst which is not an H-beta zeolite and which is different from that in the preliminary reactor.

Even though paragraph [0064] discloses an embodiment of claim 1, it does not provide the required basis for the broader features of claim 1, which also contemplates "mixed catalysts" that could be the same in the preliminary and primary alkylation reactors.

For this reason, paragraph [0064] does not provide a basis for the catalyst contained in the primary alkylation reactor.

- 4.3 The teaching in paragraph [0064] is thus not equivalent to the feature of claim 1 "a catalyst other than the H-beta zeolite catalyst is contained in the primary alkylation reactor" in the context of claim 1 and does not provide the required basis.

- 4.4 The appellant acknowledged at the oral proceedings before the board that no other basis for the feature "wherein the H-beta zeolite catalyst is contained in

the preliminary alkylation reactor and a catalyst other than the H-beta zeolite catalyst is contained in the primary alkylation reactor" could be provided, in particular as far as the catalyst in the primary alkylation reactor was concerned.

- 4.5 The appellant argues that the definition of the catalysts added to claim 1 was an allowable generalisation of the example. In fact, claim 1 as originally filed was already a generalisation of those features.

However, the catalysts disclosed in the example are very specific, and no reason was given why such specific disclosure could be generalised. In fact, the definition in claim 1 of the catalyst to be used in the preliminary and the primary reactor now requires solely that "the H-beta zeolite catalyst is contained in the preliminary alkylation reactor and a catalyst other than the H-beta zeolite catalyst is contained in the primary alkylation reactor". This represents, compared to the sole example, completely new information, not available to the skilled reader from the application as originally filed. This argument is thus not convincing.

- 4.6 Lastly, the appellant argued that the nature of the catalyst in the primary alkylation reactor was not essential for the claimed invention. The gist of the invention was in fact the nature of the catalyst in the preliminary alkylation reactor, which had to be an H-beta zeolite.

However, a basis in the application as originally filed is also required for the seemingly "less relevant" features in the context of an invention. Thus, this

argument is not convincing, either.

5. The ground in Article 100(c) EPC thus precludes the maintenance of the patent as granted.
6. It was not disputed that the catalyst contained in the primary alkylation reactor was required, in the same context, by claim 1 of all the requests on file.

For the same reasons given with respect to claim 1 of the main request, and regardless of their admissibility, all the appellant's auxiliary requests contain added subject-matter (Article 123(2) EPC).

7. None of the appellant's requests is thus allowable.

## Order

### **For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chair:



C. Rodríguez Rodríguez

P. Gryczka

Decision electronically authenticated