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Datasheet for the decision of 16 September 2009

Case Number: T 0004/07 - 3.4.02

Application Number: 97907768.2

Publication Number: 0883806

IPC: G01N 31/10

Language of the proceedings: EN

Title of invention:
Catalyst testing process and apparatus

Patentee:
UNIVERSITY OF HOUSTON

Opponent:
Degussa AG
hte Aktiengesellschaft

Headword:
-

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Main, first to seventh auxiliary requests, auxiliary request 1A - inventive step (no)"
"Eighth to tenth auxiliary request - prohibition of *reformatio in peius* (yes)"

Decisions cited:
T 0221/06, T 0659/07

Catchword:

-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0004/07 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 16 September 2009

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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 17 November 2006 concerning maintenance of European patent No. 0883806 in amended form.**

Composition of the Board:

Chairman: A. G. Klein
Members: M. Rayner
M. J. Vogel

Summary of Facts and Submissions

I. Both of the opponents OI (Evonik Degussa AG) and OII (hte AG) and also the patent proprietor appealed against the interlocutory decision of the opposition division that, taking account of the amendments made by the patent proprietor according to its second auxiliary request in the opposition proceedings, European patent 0 883 806 (application no. 97 907 768.2) meets the requirements of the Convention. The patent concerns catalyst testing. Sole independent claim 1 of this request is a method claim worded as follows.

"1. A method of simultaneously testing a plurality of candidate catalyst formulations, the method comprising supporting a plurality of different catalyst formulations separately on one or more supports, simultaneously contacting the formulations with a reactant or reactant mixture under reaction conditions in a common reactor; and
determining the relative efficacy of the plurality of candidate catalyst formulations by simultaneously (i) observing heat liberated or absorbed during the course of the reactions catalyzed by the plurality of candidate catalysts by infrared thermography, or (ii) analyzing the reactions catalyzed by the plurality of candidate catalysts by infrared spectrophotometry using an IR-sensitive camera."

Dependent claims 3, 17-23 and 27, amongst other dependent claims, are present in the statement of claim according to the second auxiliary request maintained by the opposition division, these claims being worded as follows.

"3. The method of claim 1, wherein the relative efficacy of the plurality of candidate catalyst formulations is determined by taking a sample in proximity to the respective formulations, and analyzing the sample for product by infrared spectroscopy.

17. The method of claim 1, wherein the relative efficacy of the plurality of candidate catalyst formulations is determined by spectral analysis of the reaction products at multiple wavelengths.

18. The method of claim 1, wherein the reactor is parallel reactor comprising the plurality of candidate catalysts, a plurality of reaction sites with each of the plurality of candidate catalysts being in its own reaction site, and one or more radiation-transparent windows, the reaction products or reactants are irradiated with radiation through the one or more radiation-transparent windows, and reaction products are detected by spectroscopic methods through the one or more radiation-transparent windows to determine the relative efficacy of the plurality of candidate catalysts.

19. The method of claim 18, wherein the parallel reactor is a batch reactor.

20. The method of claim 18, wherein the parallel reactor is a flow reactor.

21. The method of claim 20, wherein the flow reactor is adapted to provide uniform flow of the reactant-

containing stream through each of the plurality of reaction sites.

22. The method of claim 18, wherein the parallel reactor comprises a plurality of reaction channels as reaction sites.

23. The method of claim 22, wherein the parallel reactor comprises the plurality of reaction channels in a monolithic support.

27. The method of claim 1, wherein the reactions are analyzed by analyzing the reaction products"

II. Reference was made to documents, including the following, in the decision under appeal:

E5 "Infrared thermography and FTIR studies of catalyst preparation effects on surface reaction dynamics during CO and ethylene oxidation on Rh/SiO2 catalysts", Kellow et al., Chem. Eng. Science, 45, 2597-2602, 1990

E10 "A combinatorial approach to materials discovery", Xiang et al., Science 268, pp. 1738-40, 1995

E13 "Thermographic studies of catalytic reactions", SPIE Thermosense VII 520, pp.84-91, 1984

III. In the decision under appeal, the opposition division did not agree with opponent OII that document E10 is concerned with the same technical problem as the patent in dispute. Document E10 concentrates rather on parallel synthesis of spatially addressable arrays

containing superconducting copper oxide thin films and the property screened for is superconductivity according to the resistance of the members of the array. It could only be with inadmissible hindsight that the skilled person would have hit on document E10 as the most promising springboard for an attack on the inventive merit of claim 1. Even then, there could be no grounds for combining the teaching of document E10 with thermographic imaging as taught in documents including document E13, because there is not the slightest indication that thermography would be of any use in screening for the property of interest in document E10, namely superconductivity.

The division did, however, consider opponent OII correct to maintain that document E13 advocates explicitly using thermography to screen catalysts, even though the main thrust of the article might be directed elsewhere. The division saw no grounds for supposing that screening in document E13 is something other than screening according to the patent in dispute. Screening implies more than just observation and includes a selection step. Hence screening a plurality of different catalyst formulations is at least implicit in document E13. This is confirmed by a reference to multiple metal supported catalysts. The opposition division thus considered document E13 to represent the closest prior art to the subject matter of method claim 1, because it is the only document which explicitly advocates thermographic screening of catalysts.

In contrast to document E13, the invention according to claim 1 specifies the fixation of the catalysts

separately on one or more supports, but especially on a common support, so that they can be viewed simultaneously by the infrared camera. The technical effect obtained is that dozens of catalysts can be scanned in less time than required for a single catalyst to be evaluated by conventional methods, i.e. screening can be accelerated, sharply reducing the costs per catalyst screened. Therefore the objective technical problem to be solved in the light of document E13 was to improve the thermographic technique taught there to allow accelerated screening.

IV. The opposition division did not consider the subject matter of apparatus claim 27 and 28 of the main and first auxiliary requests before it to be novel with respect to the disclosure of document E5. However, the subject matter of method claim 1 of the second auxiliary request was considered to involve an inventive step because the skilled person would have had no reason to take up the teaching of document E5 in relation to the problem of improving the thermographic technique taught by document E13.

V. Opponent I (Evonik Degussa AG) requested that the decision under appeal be set aside and the patent be revoked. Oral proceedings were requested on an auxiliary basis. According to opponent I, all the features of claim 1 of the patent are disclosed in prior art documents. Should novelty be found, there is no inventive step in the light of the prior art documents concerned.

VI. Opponent II (hte AG) requested that the decision under appeal be set aside and the patent be revoked. Oral

proceedings were requested on an auxiliary basis. The submissions of opponent II included the argument that the subject matter of claim 1 cannot be considered to involve an inventive step in the light of, amongst others, a combination of the teachings of documents E10 and E13, the former being considered as the closest prior art.

Document E10 discloses the ability to generate and screen combinatorial libraries of solid-state compounds and that these solid state compounds include metal oxide catalysts. Screening as disclosed in document E10 can certainly be subsumed under the broad and unclear term testing of claim 1 as maintained. Document E10 obviously also discloses supporting the materials of the library on a support, Figure 3 of document E10 shows such a combinatorial library on a support. Document E10 also discloses that the formulations are in a common reactor and exposed to reactants under reaction conditions this broad requirement being fulfilled, for example, by the sintering of the library at 840°C in air as disclosed. The remaining feature of claim 1 of the patent in dispute, as maintained, over the disclosure of document E10 is the determining of the relative efficacy of two or more candidate catalyst formulations simultaneously by infrared thermography. This feature is associated with the technical effect, compared with the disclosure of document E10, that a screening method is provided that is useful to simultaneously screen catalysts. Although document E10 explicitly mentions catalysts as screening targets, document E10 fails to disclose method disputed to simultaneously screen catalysts for their relative efficacy. Therefore, the objective problem arises in

light of document E10 that a method needs to be provided to screen a large number of catalysts simultaneously. Essentially, the person skilled in the art, having realized the enormous advantage of being able to synthesize a large number of catalysts in a combinatorial library as shown in Figure 3 of document E10, would have asked for a suitable method of screening this library. The solution according to claim 1 as maintained, is to provide infrared thermography. Once the method is provided, the result of being able to determine the relative efficacy of the catalysts, i.e. to simultaneously compare their activity, is automatically achieved. This solution would have been obvious to the person skilled in the art based on the disclosure of document E13. In the second paragraph of the abstract, El3 explicitly states that infrared thermography may be useful for testing and screening catalysts. The abstract also highlights that hot spots with high activity can be determined. It would have been obvious to have screened the plurality of catalysts on a support as shown in Figure 3 of document E10 in parallel using the infrared sensitive camera of document E13. Document E13 relates to the very same reaction as the one described in the patent in dispute, i.e. the reaction of hydrogen and oxygen over a platinum catalyst as compared with example 1 of the patent in dispute. Document E13 also discloses the very same apparatus as the one described in the patent in dispute, i.e. a reactor with an infrared-transparent window. Underlying document E13 is the very same premise as the patent in dispute, i.e. to study the detailed temperature distribution by using infrared imaging techniques to measure the spatial variation of infrared radiation emitted by the catalyst during

reaction. Despite the fact that the authors of document E13 choose to also look at more complicated surface features than mere activity, document E13 explicitly suggests the use of infrared-thermography to achieve something simpler, namely screening and comparing catalysts. Therefore, having combined the clear pointer in E13 with the teaching on how to prepare large libraries of catalysts, it would have been obvious for the person skilled in the art to try to screen said library with the method suggested in document E13. To the extent that modifications of the apparatus as disclosed in document E13 to screen catalysts in parallel were even necessary, they would have to be considered as a non-inventive adaptation of an existing apparatus and to be performed routinely by an engineer.

VII. The patent proprietor requested that the patent be maintained according to one of the sets of claims filed during the appeal proceedings, i.e. main request, first auxiliary request, auxiliary request 1A and second to tenth auxiliary requests. Oral proceedings were requested on an auxiliary basis.

The case of the patent proprietor in support of its appeal includes the following.

Submission from Evonik Degussa GmbH should be dismissed as not from a party to the proceedings.

The claims of all the requests are patentable. In particular, even when considering document E10 as closest prior art, the subject matter of claim 1 of the requests differs from the disclosed embodiments in document E10 because superconductors and not catalysts

are tested, no reactor is described at all in document E10, no simultaneous method is described, and neither infrared thermography nor analyzing the reactions catalyzed by the plurality of candidate catalysts by infrared spectroscopy is disclosed in document E10.

In light of these distinguishing features a technical effect related to the distinguishing features can as such not be concluded. It is not only that a skilled person must substitute the superconductor materials with a plurality of different catalyst formulations, but also that the skilled person must modify the teaching by introducing a feature concerning simultaneously determining the relative efficacy and in particular the specific screening methods. Further, the allegation of Opponent II that document E13 relates to the very problem as the patent in dispute is not correct as document E13 relates to discovery of spatial temperature distributions on heterogeneous catalytic surfaces whereas the patent in dispute provides a new method for screening a plurality of different catalyst formulations for their relative efficacy with respect to a desired property.

If the Board of the Appeal is nevertheless of the opinion that document E10 and document E13 may be combined, even then the combination of documents E10 and document E13 does not result in the subject matter of claim 1 of the requests as document E13 does not disclose supporting a plurality of different catalyst formulations separately on one or more supports, simultaneously contacting the formulations or determining the relative efficacy of the plurality of candidate formulations simultaneously because only one

catalyst is tested in document E13. In addition imagers used scan over the catalyst.

Thus, subject matter of claim 1 of the main request as well as of respective claims in the auxiliary requests is based on an inventive step in light of the teachings of document E10 and El3.

Concerning the disclosure of the feature of simultaneously analyzing the reactions catalyzed by the plurality of candidate catalysts by infrared spectroscopy, the contested patent discloses in examples 3 and 14 infrared spectrophotometry set up as a specific embodiment of infrared spectroscopy. Reference is further directed in this respect to paragraph on page 5, lines 17 to 19 of the documents as filed, teaching the skilled person that the invention is not directed to the provision of specific sensors, but directed to the inventive use of the sensors according to the subject matter of the method. Moreover in page 2, lines 26 to page 3, line 9, page 11, lines 7 to 12, and page 16, lines 5 to 10, it is disclosed that spectroscopic methods can be used to simultaneously analyze reactions catalyzed by the plurality of candidate catalysts by infrared spectroscopic methods. Thus, a skilled person takes from the description of the contested patent that the disclosure of the contested patent is not limited to the very specific embodiment of infrared spectrophotometry using an infrared-sensitive camera as particularly disclosed in examples 3 and 14, but that also the more general embodiment relating to infrared spectroscopy is directly and unambiguously disclosed therein. Furthermore, claims 7 and 8 as originally filed support

the claimed features relating to a plurality of separate reaction sites on one or more supports and the detector being a parallel detector adapted for simultaneous observation of the reactions.

VIII. Consequent to auxiliary requests by all parties, oral proceedings, to take place on 16.09.2009, were appointed by a summons dated 23.02.2009.

In a communication attached to the summons, the board remarked, inter alia, that it was intended, if possible, to decide the case at the end of the oral proceedings. The later any amendments to a party's cases were, the more they ran the risk of not being considered.

IX. The patent proprietor requested by fax on 14.08.2009 that the oral proceedings be cancelled and fixed for another date. The reason given was that the patent proprietor and opponents had entered into negotiations which might affect the proceedings. A request in corresponding terms was filed by fax by opponent II on 20.08.2009. Opponent I submitted, with a letter dated 11.09.2009, a copy of the commercial register and a notarial attestation that the company name of opponent I had changed from Degussa AG to Degussa GmbH and then to Evonik Degussa GmbH.

X. In a communication dated 21.08.2009, the board informed the parties that the similar requests for change of date of oral proceedings following entry into negotiations as submitted in the letter of the patent proprietor dated 14.08.2009 and opponent O2 dated 20.08.2009 were not considered to meet the requirements of the Notice of the Vice Presidents (OJ 2000, 456).

Neither would the letters appear to be of a nature leading to exceptional allowance in the discretion of the board according to Article 15(2) RPBA. In particular, it was observed that negotiations are, per se, not unusual and no indication of how any particular negotiations might affect the present procedure had been given, the appeals were still live, requests for oral proceedings still stood, and no serious reasons preventing attendance of a party on the date appointed had been advanced, which date had, moreover, been known to the parties for several months. Accordingly, the date for oral proceedings was not changed. Attention was also directed to Article 15(3) RPBA [The Board shall not be obliged to delay any step in the proceedings, including its decision, by reason only of the absence of any party duly summoned who may then be treated as relying only on its written case].

XI. Following the communication of the board, opponent I withdrew its appeal by fax dated 15.09.2009 and timed at 12.43 and opponent II withdrew its opposition, appeal and all requests by fax dated 15.09.2009 and timed at 15.32. All the parties stated that they would not attend the oral proceedings on 16.09.2009, a fax to this effect from the patent proprietor being received on 15.09.2009 and timed at 13.00.

XII. The main request of the patent proprietor, auxiliary request 1A and all of the first to seventh auxiliary requests of the patent proprietor contain an independent claim with the subject matter worded according to at least one of the two following claims:

(a) Method Claim - hereinafter referred to as method claim (a)

"A method of simultaneously testing a plurality of candidate catalyst formulations, the method comprising supporting a plurality of different catalyst formulations separately on one or more supports, simultaneously contacting the formulations with a reactant or reactant mixture under reaction conditions in a common reactor; and
determining the relative efficacy of the plurality of candidate catalyst formulations by simultaneously
(i) observing heat liberated or absorbed during the course of the reactions catalyzed by the plurality of candidate catalysts by infrared thermography, or
(ii) analyzing the reactions catalyzed by the plurality of candidate catalysts by infrared spectroscopy."

(b) Apparatus Claim - hereinafter referred to as apparatus claim (b)

"An apparatus for evaluating a plurality of differing candidate catalyst formulations for catalysis, characterized in that the apparatus comprises
a parallel reactor comprising a plurality of separate reaction sites on one or more supports, each of the plurality of reaction sites being adapted for containing a different candidate catalyst, the plurality of reaction sites comprising a plurality of different candidate catalyst formulations, the reactor being adapted such that the plurality of candidate catalysts can be simultaneously contacted with one or more reactants under reaction conditions, and

a detector for determining the relative efficacy of the plurality of candidate catalyst formulations,
the detector being a parallel detector adapted for simultaneous observation of the reactions, and
the detector comprising means adapted to observe the heat liberated or absorbed during the course of the reactions catalyzed by the plurality of candidate catalysts, the means comprising an infrared camera for observing radiation emitted from or absorbed by the reactions through one or more infrared transparent windows."

XIII. Method claim (a) occurs as claim 1 in the main, first and seventh auxiliary requests. Apparatus claim (b) occurs as claim 28 in the main request, as claim 28, alternative (i), in the first auxiliary request, as claim 2 in auxiliary request 1A, as claim 19 in the second and third auxiliary requests, in alternative (i) as claim 19 of the fourth and fifth auxiliary requests and as claim 19 of the sixth auxiliary request. There is a typographical error in claim 19 of the sixth auxiliary request in that the word "separate" is moved to before the second from before the first occurrence of the word "reaction".

XIV. Eighth Auxiliary Request of the patent proprietor

Independent claim 1 according to the eighth auxiliary request corresponds to that decided by the opposition division as meeting the requirements of the Convention and is thus worded as set out in section I above. However, there are no dependent claims corresponding to the dependent claims 3, and 17-23, referred to in section I above, present in this request.

XV. The ninth and tenth auxiliary requests of the patent proprietor contain an independent claim worded, respectively, as follows.

Ninth Auxiliary Request

"1. A method of simultaneously testing a plurality of candidate catalyst formulations,
the method comprising
supporting a plurality of different catalyst formulations separately on one or more supports,
simultaneously contacting the formulations with a reactant or reactant mixture under reaction conditions in a common reactor; and
determining the relative efficacy of the plurality of candidate catalyst formulations
by simultaneously
(i) observing heat liberated or absorbed during the course of the reactions catalyzed by the plurality of candidate catalysts by infrared thermography, or
(ii) analyzing the reactions catalyzed by the plurality of candidate catalysts by infrared spectrophotometry using a filter and an infrared-sensitive camera."

There are no dependent claims corresponding to the dependent claims 3 and 17-23 referred to in section I above, present in this request.

Tenth Auxiliary Request

"1. A method of simultaneously testing a plurality of candidate catalyst formulations,
the method comprising

supporting a plurality of different catalyst formulations separately on one or more supports, simultaneously contacting the formulations with a reactant or reactant mixture under reaction conditions in a common reactor; and
determining the relative efficacy of the plurality of candidate catalyst formulations by simultaneously observing heat liberated or absorbed during the course of the reactions catalyzed by the plurality of candidate catalysts by infrared thermography."

There are no dependent claims corresponding to the dependent claims 3, 17-23, and 27 referred to in section I above, present in this request.

XVI. The oral proceedings took place on 16.09.2009 in the absence of the parties and the board gave its decision at the end thereof.

Reasons for the Decision

1. The appeal is admissible.

2. Parties to the proceedings

2.1 Consequent to the requests from the parties just before the oral proceeding, the sole remaining appellant is the patent proprietor.

2.2 Since its appeal was withdrawn, opponent I and former appellant Evonik Degussa GmbH reverts to being respondent. In view of the extracts from the commercial register and the notarial attestation submitted,

submissions from any of Degussa AG, Degussa GmbH and Evonik Degussa GmbH are treated as being from the respondent.

2.3 Former opponent II and appellant hte AG withdrew both its opposition and appeal. Nevertheless, in examination of the case, the board can take account of filings by the former opponent and appellant before such withdrawal.

2.4 Despite two of the three appeals being withdrawn in mid afternoon of the day before the oral proceedings and notification of non-attendance thereat, the case stayed live because both the appellant and the opponent I remained parties to the one remaining appeal procedure. In reaching its decision at the oral proceedings, the board had therefore to conduct the oral proceedings in the absence of the parties, who were considered to rely on their written cases in respect of all the lines of argument raised. The board had, in these circumstances, to consider the entire contents of the file, including the information presented by the former opponent and appellant, opponent II.

3. Principle of prohibition of *reformatio in peius*

This subject is of relevance where, as in the present case, the sole (remaining) appellant is the patent proprietor, the subject having been discussed in detail in recent decision T 659/07 of 28 May 2009 (see section 5.3 to 5.6 of the Reasons for the Decision). In particular, the board concerned in that decision explained (see section 5.5) that "...a patent proprietor is not even required to present a request on

appeal which would correspond to the patent as upheld by the first instance. In that case, it is perfectly clear that a Board is simply procedurally barred from examining, and even less deciding on that form of patent." The present board concurs with that reasoning.

4. Prior Art

4.1 Document E10

4.1.1 This document concerns a combinatorial approach to materials discovery. The document is concerned with generating and screening combinatorial libraries of solid state compounds, i.e. an efficient and systematic way of searching through material properties. The document opens by referring to current tremendous interest in materials such as high temperature superconductors, supermagnetic alloy, metal oxide catalysts and luminescent materials. The discovery of such materials is said to be a time consuming and rather unpredictable trial and error process, made difficult by the complexity of modern materials. One of the first applications of molecular libraries in chemistry is said to be in development of catalytic antibodies. The document then moves on to report what is said to be the first application of the combinatorial approach to the discovery of new solid state materials. Specifically, methodology has been developed that allows the parallel synthesis of spatially addressable arrays containing superconducting copper oxide thin film. A number of compounds is synthesised simultaneously, limited by the resolution of masks used. The library is sintered in air and Figure 3 shows a 128 member library on a support.

4.2 Document E13

4.2.1 This document concerns thermographic studies of catalytic reactions. According to document E13, thermographic observation has shown that spatial variations of the rate of reaction on catalytic surfaces seems to be greater than expected giving far reaching implications. The technique may be useful in the testing and screening of catalysts. The reaction studied was the catalytic oxidation of hydrogen on platinum. The setup consisted of a catalytic reactor with a sapphire window and a thermal imager. In the conclusions, it is said that improvement in catalyst utilisation could result from thermographic screening of catalysts.

5. Patentability

5.1 Document E10 refers generally to a number of different materials, including metal oxide catalysts and catalytic antibodies. The main concern of the document is combinatorial libraries and the board can see no reason to tie its general teaching about screening to the material of the specific example, i.e. solely to superconductors. There is no question of hindsight being involved in the skilled person understanding from the disclosure that combinatorial libraries are used for other materials than the specific example. In fact, there is no reason to select any one material library exclusively, since the thrust of the document relates to screening for improved material properties rather than just particular materials properties as such. Indeed, were the board to accept, that the skilled

person excluded from the teaching the using of combinatorial libraries other than for materials of the specific example, this would even mean that the screening teaching of the document would be excluded in patentability considerations for any different material, i.e. it would not be up for consideration in relation to patentability for any method simply mentioning a different material, e.g. in the present case, even the materials generally mentioned such as metal oxide catalysts, supermagnetic alloys, luminescent materials and catalytic antibodies. Such an approach is not a complete reflection of the teaching of the document and the board, thus, does not share the view of the opposition division that document E10 is not a close prior art document. On the contrary, the board's view is that, since document E10 is concerned with screening and mitigating a time consuming and rather unpredictable trial and error process with an efficient and systematic way of searching through material properties, it can be considered to represent an appropriate starting point in assessing patentability. The reason is that it is not the properties of catalysts as such which underlie the problem addressed by the teaching of the patent in dispute, but improving the screening thereof by increasing efficiency.

5.2 The Method Claim (a)

5.2.1 Document E10 makes clear that there is tremendous interest in materials such as high temperature superconductors, metal oxide catalysts and luminescent materials, but the specific example, as shown e.g. with 128 members of a library in separate sites on a common support in Figure 3, concerns examining the effects of

stoichiometry and deposition sequence on the properties of BiSrCaCuO2 films. Obviously common sintering in some kind of reactor takes place. Nevertheless, despite references to metal oxide catalysts and catalytic antibodies, it cannot be concluded that document E10 teaches determining the relative efficacy of a plurality of candidate catalyst formulations. In other words, the skilled person learns application of screening to a specific material from document E10 and that it can be applied to other materials, but not how to carry out screening for such others. The board is therefore satisfied as to novelty of the subject matter of method claim (a).

5.2.2 In applying this general teaching of document E10 to other materials, the skilled person considering further applications is led towards the materials mentioned, including catalysts. The problem addressed by the novel features of the claim is thus how to apply the screening known from document E10. In the case of candidate catalyst formulations, the board agrees with the opposition division, that document E13 advocates thermographic screening of catalysts. The fact that it does not deal with superconductors is not relevant. The board therefore considers it obvious that the skilled person would have used thermography in applying the teaching of document E10 to candidate catalyst formations. The recitation of a plurality of separate candidate catalysts in the claim, which is seen by the appellant as not reached when following document E13, is not a credible reason for recognising an inventive step because different separate materials are used according to the teaching of document E10 and this is the essence of screening. The board does not doubt that

the skilled person would have reacted and imaged the catalysts together and not one by one. Nevertheless, method claim (a) in its alternative version (i) is not up for decision by the board because the sole remaining appellant is the patent proprietor leading to a consequent prohibition of *reformatio in peius*.

5.2.3 Feature (ii) of claim 1 is not explicitly disclosed in document E13. The board had therefore to establish what exactly is meant by this feature. In doing this the board drew on the submissions of the patent proprietor relating to support for this feature in the documents as filed, i.e. mainly

(a) page 5, lines 17 to 19

"Sensors: The sensors used to detect catalytic activity in the candidate catalysts are not narrowly critical but will be as simple as practical"

(b) page 2, line 26 to page 3, line 9

"The reaction occurring in each cell is measured, e.g. by infrared thermography, spectroscopic, electrochemical, photometric, thermal conductivity or other method of detection of production or residual reactants, or by sampling, e.g. by multistreaming through low volume tubing, from the vicinity of each combination, followed by analysis e.g. spectral analysis, chromatography et., or by observing temperature change in the vicinity of the catalyst e.g. by thermographic techniques, to determine the relative efficacy of the catalysts

in each combination. Robotic techniques can be employed in producing the cell, spots, pellets, etc."

(c) page 5, lines 26 to 30

"Other suitable sensors include electrochemical, fluorescence detectors, NMR, NIR, FTIR, Raman, flame ionization, thermal conductivity, mass, viscosity and stimulated electron or X-ray emission."

(d) page 11, lines 7 to 12, repeated at page 16, lines 5 to 10

"Pellets are then contacted one at a time with a potentially reactive mixture (for example. by elutriation into an enclosed volume) and their activity measured (by thermography, by spectroscopic measurement of products, or sampling of the surrounding vapor or liquid phase)"

(e) claim 7

"7. Apparatus comprising an array of catalyst formulations comprising support means, a plurality of different formulations individually fixed to said support means and adapted to contact said formulations with a reactant or reactants under reaction conditions further comprising detector means adapted to detect relative temperature or heat absorption or emission of individual formulations in the array under the reaction conditions."

(f) claim 8

"8. An apparatus according to Claim 7 wherein said detector means comprises infrared radiation-sensitive camera means, scanning diode, Raman, FTIR, NMR, ESR, GC, mass spectroscopy, GC/MS, liquid chromatography, an enzyme, a cell, an antibody, light emission spectroscopy, an additional reagent for detecting or identifying reaction or product, an infrared radiation-sensitive element, thermoelectric element, Stirling cooling apparatus and/or other spectrographic or thermographic means."

5.2.4 In the foregoing parts of the patent in dispute, "analyzing the reactions catalyzed by the plurality of candidate catalysts by infrared spectroscopy" is portrayed as one of a number of possibilities. The formulation is very general as to sensor and form of analysis. The board considers that, in fact, the choice of infrared spectroscopy amounts to no more than a choice of one of a number of obvious possibilities alternative to thermography which are obvious to the skilled person. Such general alternative obvious possibilities are added in this manner as a matter of common practice by the skilled patent draughtsman. Were the board to see an inventive step in analysing by infrared spectroscopy, it would logically have to see all the other obvious possibilities as inventive. This is not, therefore, an acceptable route to subject matter involving an inventive step. The board also points out by way of illustration that FTIR (Fourier

transform infrared spectroscopy) is known from in document E5, even from the title.

5.2.5 The board therefore reached the view that the subject matter of method claim (a), alternative (ii) cannot be considered to involve an inventive step.

5.3 The Apparatus Claim (b)

5.3.1 Differing prior art documents as between the method and apparatus claims, in particular in respect of closest prior art, were presented by the opposition division in its analysis of patentability. The different approach led to a positive result for the method claim (closest prior art - document E13) and a negative result for the apparatus claim (closest prior art - document E5).

5.3.2 The board sees no reason to consider any document other than document E10 as closest prior art, as the underlying teaching of screening is just as relevant to the apparatus claim as the method claim. Nevertheless, in taking this view, the board makes no comment as to the correctness or otherwise of the analysis made by the opposition division with respect to document E5.

5.3.3 The subject matter of apparatus claim (b) differs from the disclosure of document E10 by virtue of features specific to the candidate catalyst formulations, but not screening apparatus, a parallel reactor or the plurality of separate sites. Of course, in evaluating catalysts, the skilled person knows the reaction sites must be adapted for containing different candidate catalyst formations for simultaneous contact with reactant in the reactor. Therefore, analogously to the

reasoning applied to the method claim (a), the skilled person would have used the screening apparatus of document E10 following the reference to catalysts, by using means observing heat liberated or absorbed according to document E13, i.e. using an infrared camera and window disclosed. When observing the plurality of reactions sites on the support of document E10, it is obvious that the entire support should be detected and not the candidate catalysts one by one.

5.3.4 The board therefore reached the view that the subject matter of apparatus claim (b) cannot be considered to involve an inventive step.

5.4 Main Request, First Auxiliary Request, Auxiliary Request 1A and second to seventh auxiliary requests

5.4.1 From decision T 221/06 of the present board, which decision was subject to review by the Enlarged board in case R11/08, it can be concluded that it is established practice that if a Board of Appeal considers that a claim common to two or more requests is unallowable, all of those requests fail at that point (see point 3 of the Reasons in case R11/08).

5.4.2 As set out in Section XII of the Facts and Submissions above, the main request of the patent proprietor, auxiliary request 1A and all of the first to seventh auxiliary requests contain an independent claim with the subject matter worded according to at least one of method claim (a) and apparatus claim (b). The obvious typographical error in claim 19 of the sixth auxiliary request does not change the substance of the claim obvious subject matter of the claim. Therefore all of

these requests fail because they contain at least one unallowable claim.

5.5 Eighth auxiliary request

5.5.1 Claim 1 of this request corresponds to the independent claim of the second auxiliary request upon which the positive decision of the opposition division was based. Claim 1 is thus not up for decision by the board because the sole remaining appellant is the patent proprietor leading to a consequent prohibition of *reformatio in peius*. However, the eighth auxiliary request differs from the second auxiliary request upon which the positive decision of the opposition division was based because it contains no dependent claims corresponding to the dependent claims 3, and 17-23, referred to in section I of the Facts and Submissions above. Therefore, were the board to decide positively on this request, these claims would be lost to the patent proprietor. There is prohibition of *reformatio in peius* when the sole (remaining) appellant is the patent proprietor and for this reason, the board cannot accept the eighth auxiliary request.

5.6 Ninth auxiliary request

Claim 1 of this request is restricted by reference to a filter in the last line compared with the independent claim of the second auxiliary request upon which the positive decision of the opposition division was based. The claim was drafted at an early stage in the appeal proceedings, when it was still possible that appeals of the other side against the claim maintained by the opposition division could succeed. In view of the

principle of prohibition of *reformatio in peius* in the present case, the request is not appropriate to the stage of the proceedings and the board cannot therefore accept it. It is also observed that a further reason for non acceptance is that contrary to the principle of prohibition of *reformatio in peius* dependent claims 3, and 17-23, referred to in section I of the Facts and Submissions above would also be lost in this request.

5.7 Tenth auxiliary request

Claim 1 of this request lacks any reference to alternative (ii) compared with the independent claim of the second auxiliary request upon which the positive decision of the opposition division was based. It is also observed dependent claims 3, 17-23 and 27 referred to in section I of the Facts and Submissions above would also be lost in this request. In view of these losses to the patent proprietor and taking account of the principle of prohibition of *reformatio in peius* in the present case, the board cannot accept the request.

6. Procedure

The present board agrees with the view expressed in decision T 659/07, and therefore considers itself barred from examining or deciding on the form of patent maintained by the opposition division. Since, unlike the opponents, the patent proprietor maintained its appeal, a reasoned decision of the board became necessary even where requests on file, such as the later auxiliary requests, may not have reflected the latest procedural stage of the file, for example withdrawal of the appeals of the opponents. The

decision desired by the patent proprietor can, in view of the substantive and procedural barriers explained above, not be to accept any of the requests, but must be to dismiss the appeal and thus let the decision of the opposition division stand. Such a decision takes account of the principle of prohibition of *reformatio in peius* as the patent proprietor has not lost anything. Moreover, in the present decision, the board underlines that patentability has been dealt with only with respect to the documents mentioned. In the board's view, this situation does not permit drawing conclusions concerning compliance or lack thereof with other provisions of the EPC. For example, consideration of inventive step in relation to features now claimed does not indicate the board's view as to whether or not those features were supported by the documents as filed.

Order

For these reasons it is decided that:

The appeal of the patent proprietor is dismissed.

The Registrar The Chairman

M. Kiehl A. G. Klein