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D E C I S I O N
of 26 April 2002

Case Number: T 0117/98 - 3.3.2

Application Number: 90118072.9

Publication Number: 0424667

IPC: A61L 2/08

Language of the proceedings: EN

Title of invention:

A salt restored from discoloration and a method for this restoration

Patentee:

GAMBRO AB

Opponent:

FRESENIUS AG

Headword:

"Decolourised Sodium Bicarbonate"/GAMBRO AB

Relevant legal provisions:

EPC Art. 54, 56, 83, 113(1), 123(2)
EPC R. 71(2)

Keyword:

"Main request, first auxiliary request: "product-by-process" claim 1 unacceptable, inter alia, under the terms of Articles 83 EPC and 123(2) EPC; main request, first and second auxiliary requests: independent process claim in each of the three requests identical; process relating to a method for restoring the original colour of sodium bicarbonate discoloured by radioactive radiation obvious in the light of the state of the art."

Decisions cited:

G 0004/91, T 0301/87, T 0341/92

Catchword:

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Case Number: T 0117/98 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 26 April 2002

Appellant: GAMBRO AB
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Respondent: FRESENIUS AG
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 2 December 1997
revoking European patent No. 0 424 667 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: U. Oswald
Members: G. F. E. Rampold
S. U. Hoffmann

Summary of Facts and Submissions

I. The appellant is proprietor of European patent No. 0 424 667 which was granted with 9 claims in response to European patent application No. 90 118 072.9. Claim 1 of the patent as granted was worded as follows:

"A salt sterilized by radioactive radiation, eg gamma irradiation and/or beta irradiation, of the type which obtains discoloration on irradiation, **characterized** in that its original colour is wholly or partly restored by means of heat or recrystallization in a wholly sterile environment."

II. The respondent filed notice of opposition requesting revocation in full of the European patent under Article 100(a) EPC on the grounds of lack of novelty and inventive step and under Article 100(b) EPC on the ground of insufficiency of disclosure.

Of the numerous documents cited by the respondent during the first-instance opposition and subsequent appeal proceedings against the patentability of the claimed subject-matter in the patent in suit, the following remain relevant to the present decision:

- (2) H. Kaschenz, "*Strahlenphysikalische Beeinflussung des Salzgesteins bei der Lagerung hochradioaktiver Abfälle in Salzformationen*", published in *Kernenergie, Zeitschrift für Kernforschung und Kerntechnik*, 20. Jahrgang 1977, pages 35-38
- (3) EP-A-0 278 100

- (5) Römpps Chemie-Lexikon, 7. Auflage, 1974,
page 2277, entry: "*Natriumhydrogencarbonat*"
- (9) Fachlexikon ABC Physik, 1974, pages 324 to 325,
entry: "*Eigenfehlstellen*"; pages 450 to 452,
entry: "*Farbzentrum*"
- (10) Römpp Lexikon Biotechnologie, 1992, page 729,
entry: "*Sterilisation*"
- (11) Ullmanns Encyclopädie der technischen Chemie,
1960, Band 12, pages 653 to 654
- (12) Karl A. Hofmann, Anorganische Chemie, Friedrich
Vieweg & Sohn, Braunschweig 1963, page 437

III. After considering the grounds for opposition, the opposition division revoked the European patent pursuant to Article 102(1) EPC at the conclusion of the oral proceedings. The decision to revoke the patent was based on an amended set of five claims.

The stated ground for the revocation of the patent was lack of inventive step under Article 100(a) EPC in conjunction with Article 56 EPC of both the product according to claim 1 and the process according to claim 3.

In its decision the opposition division considered that the disclosure of the claimed invention in the patent in suit provided sufficiently clear and complete technical information and instructions enabling a person skilled in the art to determine without undue burden a suitable range of temperature and, dependent thereon, an appropriate time period required for the

heat treatment so as to restore the original colour of sterile sodium hydrogen carbonate salts discoloured during sterilisation by radioactive radiation. Consequently, the opposition division found in the opponent's submissions no basis for an objection under Article 83 EPC and accordingly no ground for opposition under Article 100(b) EPC.

Regarding the respondent's objection to lack of novelty, the opposition division concluded that the state of the art according to (3) which was cited against the novelty of claim 1 did not disclose or in any other way refer to sterile white sodium hydrogen carbonate and was accordingly not prejudicial to the novelty of the attacked claim.

As to inventive step, the opposition division considered citation (3) to form the closest state of the art, since (3) already referred to the sterilization of sodium bicarbonate material by means of gamma radiation. Further, in the opposition division's decision it was recalled that, according to the appellant's own submissions, the discolouration of sodium bicarbonate salts during sterilization by radioactive radiation was likewise already known at the priority date of the patent in suit.

With reference to citations (2) and (9) , the decision went on to state that high energy irradiation, eg gamma irradiation, of crystals, such as, for example, alkali metal halide salts, was known to create electronic defects in the crystal lattice through electron displacement reactions, and consequently, to result in rapid discolouration of such salt crystals. The cited documents referred, however, also to the possibility of

restoring the original colour of the irradiated crystal salts by subjecting them to heat treatment at various, in most cases relatively narrow ranges of temperature, depending, *inter alia*, on the mobility of the particular lattice defect. Although citations (2) and (9) were specifically concerned with alkali metal halides, the opposition division considered it would have been obvious to the skilled person to apply the above-mentioned technical teaching of (2) and (9) also to the solution of the problem of restoring the original colour of sterile sodium bicarbonate salts discoloured during sterilization by radioactive radiation.

In this context, the opposition division argued that the proprietor's considerations as to the potential theoretical background for the discolouration of sodium hydrogen carbonate by radioactive radiation, such as the alleged formation of a certain type of CO_2^- radical ions, were entirely irrelevant to the assessment of inventive step in the present case. Moreover, the opposition division denied the existence of an alleged prejudice in the state of the art against the exposure of discoloured sodium bicarbonate to heat treatment exceeding its normal decomposition temperature, since the skilled person would have been aware of suitable means and methods to avoid such undesired decomposition reactions.

IV. The appellant lodged an appeal against the decision of the opposition division and filed together with the statement of the grounds of appeal a new main request and two auxiliary requests to replace all previously filed requests. The main request consists of five claims reading as follows:

- "1. A salt consisting of sodium hydrogen carbonate sterilized by radioactive radiation, eg gamma irradiation and/or beta irradiation, of the type which obtains a discolouration on irradiation, **characterized** in that its original colour is wholly or partly restored by means of heat in a wholly sterile environment.

2. A salt in accordance with claim 1, **characterized** in that its original colour is restored by means of heat during a time period depending on the temperature and long enough to restore the original colour at least partly.

3. A method for restoring the original colour of a salt consisting of sodium hydrogen carbonate sterilised by radioactive radiation of the type which obtains discolouration on irradiation, **characterized** in that it is carried out with the help of heating during a time period depending on the temperature and long enough to restore the original colour at least partly.

4. A method in accordance with claim 3, **characterized** in that temperature and duration of treatment are selected according to the following relations:
 - a) one day at 65°C resulting in a diminishing discolouration,

 - b) three days at 75°C resulting in a natural-coloured substantially white powder,

 - c) one day at 85°C resulting in a natural-coloured substantially white powder,

- d) six hours at 95°C resulting in a natural-coloured substantially white powder,
 - e) three hours at 105°C resulting in a natural-coloured substantially white powder.
5. A method in accordance with claim 3 or 4, **characterized** in that duration and temperature are selected independently of the dose of radiation which may be, for example, 25 kGy or 50 kGy."

The first auxiliary request likewise consists of five claims, claim 1 reading as follows:

- "1. A salt consisting of sodium hydrogen carbonate sterilized by radioactive radiation, eg gamma irradiation and/or beta irradiation, of the type which obtains a discolouration on irradiation, **characterized** in that its original colour is wholly restored by means of heat in a wholly sterile environment."

Claims 2 to 5 are identical with claims 2 to 5 in the above main request.

The second auxiliary request consists of process claims 3 to 5 (renumbered as claims 1 to 3) in the above main request.

In addition, the statement of the grounds of appeal was accompanied by the following publication:

- (13) R. W. Holmberg, "ESR Study of Gamma-irradiated Single Crystals of Potassium Bicarbonate at 77°K", published in J. Chem. Physics, vol. 55, no. 4,

August 1971, 1730-1735.

- V. Oral proceedings were held on 26 April 2002 in the absence of the appellant. It had informed the Office in advance that it would not be represented at the hearing. At the oral proceedings, the requests made by the appellant in writing in the statement of grounds of the appeal were considered.
- VI. In its submissions presented in the statement setting out the grounds of appeal, the appellant essentially contended that the opposition division committed a substantial procedural violation when it refused to accept any further requests presented by the appellant during the oral proceedings before it and required the appellant to choose between (a) revocation of the patent in suit on the ground of lack of novelty on the basis of the claims submitted in the written procedure or (b) agreement to the claims forming the basis for the decision under appeal as constituting the appellant's sole admissible request for amendment.

According to the appellant, the instruction in claim 1 of the main and first auxiliary requests and likewise in the patent specification to the effect that sodium hydrogen carbonate salts are to be subjected to sterilization and heat treatment for restoring their original colour in a "wholly sterile environment" was sufficiently clear and complete for it to enable a person skilled in the art to carry out the claimed invention in practice, thereby arriving at a salt which was sterile and the original colour of which was wholly or partly restored. As it was thus sufficient for the adequate performance of the claimed invention to conduct sterilization and heat treatment of the

discoloured sodium bicarbonate in a wholly sterile environment, there was no basis for the respondent's speculative considerations as to whether or not a closed vessel should be used for this.

As to novelty the appellant argued that exposing sodium hydrogen carbonate to radioactive radiation caused discolouration of the salt up to the point of colour saturation, long before the salt had received a sufficient dose of radiation required for sterilization. In contrast thereto, the claims in the present requests required that the original colour of sodium hydrogen carbonate be at least partly restored or, differently expressed, that its degree of discolouration lie somewhere between its point of colour saturation and its white original colour. In the absence of any prior art disclosing sodium hydrogen carbonate salts showing a degree of discolouration lying between the above-mentioned limits, the claimed salt in the patent in suit was undoubtedly novel.

Publication (13) indicated that potassium bicarbonate, when exposed to radioactive radiation at 77°K, formed a variety of radicals and one of these radicals, which was comparatively stable at room temperature, had been identified as being similar to the CO_2^- radical anion. Although (13) did not indicate anything about the colour of the salt or crystals, when this particular radical was observed in a single crystal of KHCO_3 , one could nevertheless assume that this type of radical was possibly at least partly responsible for the pink colour observed in radioactively irradiated sodium bicarbonate. As one could further assume that sodium bicarbonate behaved upon irradiation approximately in the same manner as potassium bicarbonate and radicals

had in general an increased tendency to undergo reactions, this could possibly explain the appellant's unexpected finding that much lower temperatures were necessary for restoring the original colour of radioactively irradiated sodium hydrogen carbonate than those reported in the state of the art for the decolouration of irradiated sodium chloride.

The skilled person, faced with the problem to restore the original colour of sodium hydrogen carbonate, would have known that temperatures close to 300°C were necessary for bleaching sodium chloride. As could be derived from the disclosure of citation (5), sodium bicarbonate salts, when heated to a temperature of more than 65°C, were prone to releasing carbon dioxide and water and undergoing decomposition into sodium carbonate. Consequently, there existed a general prejudice in the state of the art against heating sodium bicarbonate above its normal decomposition temperature.

VII. In its written submissions and during oral proceedings before the board the respondent argued essentially as follows:

The requirement of maintaining a "wholly sterile environment" was disclosed in the application as filed only in the context of the process for restoring the original colour of sodium hydrogen carbonate by a recrystallization process. The introduction of this procedural requirement in claim 1 of the present main and first auxiliary requests relating to heat treatment for restoring the original colour was therefore a clear contravention of Article 123(2) EPC.

The patent in suit stated in its introductory portion that attempts made in the prior art to guarantee absolute sterility in the context of providing sterile sodium hydrogen carbonate salts for medical purposes were generally unsuccessful. In spite of this, the appellant had repeatedly and clearly indicated that maintenance of a wholly sterile environment during sterilisation and heat treatment of the salt was an indispensable procedural feature for the proper function of the claimed invention. There was no enabling disclosure anywhere in the patent in suit as to how a wholly sterile environment could be achieved or maintained. Moreover, citation (10) provided appropriate evidence that this desideratum was, in principle, technically neither realisable nor verifiable. Consequently, the patent in suit did not satisfy the requirement for sufficiency of disclosure laid down in Article 83 EPC.

The opposition division was correct in its finding that sodium hydrogen carbonate, which was discoloured during radioactive irradiation, was known in the state of the art. Despite having undertaken to do so in the statement of the grounds of appeal, the appellant had failed to provide comparative evidence to prove its allegation that a distinct and verifiable difference existed between a sodium bicarbonate salt discoloured by radioactive radiation up to the point of colour saturation and one the original colour of which had been partly restored by heat treatment. The subject-matter of the product claims was therefore no longer novel.

The appellant's ex post facto attempt to create a prejudice against the application of heat to sodium

hydrogen carbonate for restoring its original colour was based on deliberately disregarding fundamental pieces of common basic knowledge in the state of the art, as represented, for example, by citations (10) to (12).

On the contrary, the skilled person, faced with the problem of providing a method for bleaching sodium hydrogen carbonate discoloured by radioactive radiation found himself in a so-called "one-way-street" situation. The state of the art pointed the skilled person clearly and directly towards the use of heat treatment for solving the problem of restoring the original colour of sodium hydrogen carbonate discoloured by radioactive radiation. The proposed solution to this problem in the patent in suit was entirely analogous to the known application of heat to a variety of other salts discoloured by radioactive irradiation, eg sodium chloride, in order to solve the same or a similar problem, namely to restore their original colour. As it was already known that electron lattice defects in different salts can be remedied by way of heat at different temperatures, determination of suitable temperatures and time periods for the decolouration of sodium hydrogen carbonate was a matter of routine for the skilled person. The claimed subject-matter in the patent in suit was therefore devoid of inventive step.

VIII. The appellant requested in writing that the decision under appeal be set aside and that the patent be maintained in amended form either on the basis of the sets of claims in the main request or in one of the first or second auxiliary requests, all submitted together with the statement of the grounds of appeal.

It requested further that the appeal fee be reimbursed.

The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

Main request, first auxiliary request: claim 1

2. In its submissions presented in writing and during oral proceedings, the respondent objected, *inter alia*, under Articles 123(2) and 83 EPC, to the present version product claim 1 in the main and first auxiliary requests. More detailed grounds for the respondent's objections in this respect are set forth in paragraph VII above.

- 2.1 As is apparent from paragraph IV above, claim 1 as it now stands in the aforesaid requests is drafted in the form of a "product-by-process" claim. The product of claim 1 is designated as "a salt consisting of sodium hydrogen carbonate sterilized by radioactive radiation". This product is characterized in the characterizing portion of claim 1 solely in "that its original colour is wholly or partially restored by means of heat **in a wholly sterile environment**".

- 2.2 The characterizing portion of product claim 1 in the application as filed merely required that the original colour of the irradiated salt be wholly or partially restored.

The originally filed independent process claim 4

related to "a method for restoring the original colour of a salt sterilised by radioactive radiation of the type which obtains discolouration on irradiation, characterized in that it is carried out with the help of heating".

The board is aware that the application as filed stated on page 3, lines 22 to 23, that "alternatively the discolouration can be eliminated by means of **recrystallization** with the help of **sterile water**". It is also aware that the originally filed independent process claim 8 stipulated that the method for restoring the original colour of a salt sterilized by radioactive radiation should "take place with the help of **recrystallization** in a **wholly sterile environment**."

- 2.3 Nowhere in the application as filed, however, is reference made, either explicitly or implicitly, to a salt consisting of hydrogen carbonate discoloured during sterilization by radioactive radiation, the original colour of which was wholly or partly restored **by means of heat** in a sterile environment, let alone in a **wholly sterile environment**.

Nor is there any explicit or implicit disclosure of suitable means and methods which would have enabled the skilled person at the filing date of the patent in suit to create a **wholly sterile environment**. This, however, would be a prerequisite to enable the original colour of the salt to be restored by means of heat in such an environment. It would be immediately apparent to the skilled person that the particular properties, for example the degree of sterility, of the product of claim 1 would be different depending on whether the heat treatment to restore the original colour of the

claimed salt was carried out in a wholly sterile environment or not.

2.4 In view of the foregoing, the board unhesitatingly concurs with the respondent's objections under Articles 123(2) and 83 EPC to the claimed invention in claim 1 in the main and first auxiliary requests.

2.5 Since product claim 1 in both the main and the first auxiliary requests must fail for the reasons given in the foregoing points, the board sees no need for a decision on the respondent's further objections to the validity of this claim.

Main request, first auxiliary request: claim 3; second auxiliary request: claim 1

3. As is apparent from paragraph IV above, claim 3 in the main request and first auxiliary request is drafted as an independent process claim which contains no reference at all to either of the preceding product claims and which is identical in wording with claim 1 in the second auxiliary request. The patentability of this claim has therefore to be assessed independently from any other claims in the requests now on file.

The independent process claims which are identical in wording in all three requests on file are hereinafter referred to as "the claim".

3.1 The claim relates to a method for restoring the original colour of sodium hydrogen carbonate discoloured during sterilization by radioactive radiation (see paragraph IV above).

The respondent objected to this claim, *inter alia*, under Article 84 EPC. Although the board would agree that the wording of the claim gives rise to a serious problem of lack of clarity, such an objection cannot be raised in the present proceedings because Article 102(3) EPC does not allow objections to be based upon Article 84 EPC if they do not arise out of the amendments made to the patent as granted (see T 301/87, OJ EPO 1990, 335). In the present case, the wording of the claim is identical in every aspect with that of the corresponding independent process claim 4 as granted, with the sole exception that the salt the original colour of which is to be restored by the claimed method is now limited to sodium hydrogen carbonate. However, the proposed limitation in itself does not pose a problem of clarity and does not, therefore, give rise to any objection under Article 84 EPC.

4. Novelty of the claimed process was not at issue in the present case. Since none of the citations available to the board from the proceedings before the EPO discloses a method for restoring the original colour of sodium hydrogen carbonate discoloured during sterilization by radioactive radiation as defined in the claim, the claimed method is deemed to be novel within the meaning of Article 54(1) EPC.
5. The sterilization of sodium hydrogen carbonate by means of radioactive radiation such as gamma radiation was already known in the state of the art (see (3), especially page 10, lines 7 to 9). As has been admitted by the appellant itself during the proceedings before the opposition division (see facsimile dated 28 December 1996 and conformation letter filed on 3

January 1997, page 3, paragraph 7), it was likewise known at the priority date of the patent in suit that sodium bicarbonate salts are discoloured during sterilization by radioactive radiation.

5.1 Starting from the prior art referred to in point 5 above as representing the closest state of the art, the problem to be solved by the claim is to be seen as that of providing a process or method for restoring at least partly the original colour of sodium hydrogen carbonate following its discolouration during sterilization by means of radioactive radiation, eg gamma irradiation. With reference to the observations in points 2.2 to 2.4 above, the board considers it appropriate and necessary to emphasise that neither the claim nor the description contains any technical feature or teaching reflecting the requirement of maintaining the sterility of radioactively irradiated sodium hydrogen carbonate at least to a certain degree during heat treatment to restore its original colour. Consequently, the requirement of maintaining sterility during heat treatment cannot form part of the objective problem to be solved by the method defined in the claim.

5.2 The solution to the stated problem essentially comprises subjecting sodium hydrogen carbonate discoloured by radioactive radiation to a heat treatment during a time period depending on the temperature used and long enough to restore its original colour at least partly.

On the basis of the skilled person's technical knowledge as set out, for example, in citations (2) and (9) and in the absence of any reasoned argument or evidence to the contrary, the board has no reason to

doubt that the problem has been plausibly solved. Since this was not contested, there is no need to give further details.

6. It still remains to be examined whether the subject-matter of the claim involves an inventive step with regard to the teaching of the cited documents.
- 6.1 The skilled practitioner seeking a solution to the stated problem in the prior art would have been aware, *inter alia*, of citation (9). This citation is a standard handbook ("Fachlexikon") in physics and provides to the skilled person the general common teaching that irradiation of crystals with ionizing radiation, eg gamma rays, causes ionization reactions in the crystal resulting in the formation of an equal number, ie a pair, of electrons and defect electrons, thereby creating electronic defects in the crystal lattice (f-centres). This leads to a rapid increase of discolouration of the crystal up to the point of colour saturation. The cited document goes on to state that irradiation with ionizing radiation does not alter the stoichiometric composition of the crystals. When the temperature of the crystal is raised above that at which a particular pair of electrons is formed, the defects become unstable or mobile. As the number of electrons formed during irradiation and the number of defect electrons are equal, these electrons will then easily recombine when the temperature of the crystal is raised above that at which a particular set of electronic defects is formed, to restore the crystal to its pre-irradiation condition and, accordingly, to restore its original colour.

This mechanism is said in (9) to be the reason why the discolouration caused by irradiation is less stable than the so-called additive discolouration (see (9), especially Chapter 2: "Discolouration on Irradiation with Ionizing Radiation, page 451 to 452).

- 6.2 In the board's view, citation (9) contains a clear suggestion to rely on heat treatment for restoring the original colour of sodium bicarbonate discoloured by radioactive irradiation. Apart from the fact that the above general common teaching is shown in (9) to be clearly applicable for all kinds of crystals, the appellant failed to provide appropriate evidence or a reasoned explanation as to why the skilled person should have expected crystals of sodium hydrogen carbonate to behave differently under irradiation with radioactive radiation and subsequent exposure of the crystal to a heating procedure.
- 6.3 In particular, the appellant has failed to persuade the board with its mere assumption that the pink colour of sodium hydrogen carbonate, when exposed to radioactive radiation, would possibly be attributed by a skilled person, at least partly, to the formation of CO_2 -radical anions rather than to electronic defects (f-centres) in the crystal lattice. Publication (13), on which the appellant relies in support of its assumption, discloses that one of the five radicals observed in electron spin resonance (ESR) studies of potassium bicarbonate grew in when a sample of potassium bicarbonate was gamma-irradiated at 77°K and the sample warmed to room temperature. In this context (13) states that this or a similar radical was also observed in room-temperature irradiated KHCO_3 and that it had g values and ^{13}C hyperfine structure very similar to

those of CO_2^- (see especially page 1734, right-hand column, radical E).

According to (13), the above-mentioned radical was observed solely in potassium hydrogen carbonate and under the specific conditions and in the absolute environment required for ESR studies. The notional skilled person would, however, know that such a radical would neither be detectable nor stable in the regular atmosphere surrounding sodium hydrogen carbonate during irradiation at room temperature and essentially consisting of vapour (H_2O) and CO_2 . Thus, in view of the fact that (a) a radical similar to CO_2^- could only be observed in (13) under the particular conditions and environment used in ESR studies of a **single crystal** of **potassium** bicarbonate and that (b) such a radical would not be considered by the skilled person to be stable over a reasonable period of time under the conditions and in the environment used in the claimed method in the patent in suit relating to **sodium** bicarbonate, the scientific teaching of (13) is clearly based on, and limited to, the special premises of ESR-studies in gamma irradiated single crystals of KHCO_3 . Consequently, the scientific study reported in (13), in the board's judgment, provides no sound basis, let alone any convincing evidence, to support the mere assumption that discolouration of radioactively irradiated sodium hydrogen carbonate might originate at least partly from the formation of a specific type of a radical anion rather than from the formation of electronic defects in the crystal lattice. Only the latter is a well-established physical phenomenon known to result from high energy irradiation in all types of crystals.

Moreover, raising the temperature of the crystal would in any case result in recombination of the charge carriers, thereby restoring the perfect crystal in its original colour, irrespective of whether discolouration of sodium hydrogen carbonate was caused by the formation of radical anions or lattice defects. The question of the exact mechanism involved in the discolouration would therefore be entirely irrelevant to the assessment of inventive step in the present case.

- 6.4 The appellant's observation that sodium hydrogen carbonate salts are prone to undergo bleaching and decolouration at temperatures in the range of from 65°C to 105°C, whereas temperatures close to 300°C would be required for bleaching sodium chloride, cannot substantiate an inventive step either. Apart from the fact that the claim contains no technical feature relating to the particular temperature and time period required for, or actually applied to, bleaching or decolouration of sodium bicarbonate in the claimed method, the skilled person would know, for example, from the teaching of (9) that lattice defects in different crystals are remedied by heat treatment at strikingly different and in most cases relatively narrow ranges of temperature, depending, *inter alia*, on the mobility of the particular lattice defect in a specific type of crystal.

Moreover, the respondent has explained during oral proceedings, to the satisfaction of the board, that under the conditions chosen for heat treatment the bleaching or decolouration reaction of discoloured, radioactively irradiated salt crystals is from a kinetic point of view of the first order. The skilled

person would consequently be able to determine a correlation between the temperature applied to the crystal and the time period required to restore its original colour. Thus, he would be aware that decolouration can be achieved in one and the same type of crystals or in different types of crystals at lower temperatures, if at the same time the period of heat treatment is extended. Incidentally, this is clearly the relevant technical teaching of the claim: "heating during a time period depending on the temperature and long enough to restore the original colour at least partly".

6.5 Finally, the board cannot recognise any prejudice that might have stopped or diverted the skilled person away from exposing discoloured sodium hydrogen carbonate salts to a heat treatment at temperatures exceeding their normal decomposition temperature in order to achieve their rapid decolouration. The skilled practitioner, faced with the actual technical problem, would have known that

(i) NaHCO_3 which is stable in dry air at room temperature decomposes above 65°C into Na_2CO_3 , H_2O and CO_2 ; this decomposition is complete above 300°C (see (5), end of left-hand column to right hand column, line 4);

(ii) calcination of NaHCO_3 to produce Na_2CO_3 is carried out above 125°C according to the following equilibrium reaction:



removal of $\text{H}_2\text{O} + \text{CO}_2$ would shift the equilibrium

towards the formation of Na_2CO_3 ; **increase of the partial pressure of CO_2** would shift the equilibrium towards the formation of NaHCO_3 [see (11)];

- (iii) the partial pressure of CO_2 in the above equilibrium is at **60°C** about **25 torr** at **100°C** about **310 torr** [see (12)].

According to the established case law of the Boards of Appeal, a solution to a problem put forward as overcoming a prejudice should clash with the prevailing teaching of experts in the field, ie their unanimous evidence and notions (see Case Law of the Boards of Appeal, 4th edition 2001, I.D.7.2 pages 134 to 135). This is clearly not the case here. On the contrary, the skilled man would have known in the present case suitable means and methods, for example, increasing the partial pressure of CO_2 , in order to successfully avoid or at least minimize decomposition of sodium hydrogen carbonate during heat treatment.

- 6.6 In the present situation, this notional skilled person was provided with a clear hint from the prior art pointing him in the direction of the claimed method for restoring the original colour of sodium hydrogen carbonate discoloured by radioactive radiation, and it was only necessary to confirm experimentally that the highly probable result was in fact obtained. Once the development of a method for restoring the original colour by subjecting sodium hydrogen carbonate to a heat treatment became obvious, determination of the appropriate temperature range and time period required for this was then purely a matter of routine experimentation. The necessity of experimentally

confirming a reasonably expected result does not render a claimed invention unobvious.

6.7 Since the claim is present in all three requests on file and a decision can only be taken on a request as a whole, all three requests must fail under Article 56 EPC for lack of inventive step as well.

7 Pursuant to Rule 67 EPC the reimbursement of the appeal fee can be ordered, among other reasons, where the board deems an appeal to be allowable. As the present appeal cannot succeed, for the foregoing reasons, the requirements under Rule 67 EPC for reimbursement of the fee for appeal are not satisfied in the present case.

8. In decision G 4/92 (OJ EPO 1994, 149), the Enlarged Board of Appeal viewed the possibility of holding oral proceedings in a party's absence, as provided for in Rule 71(2) EPC, in relation to the need for proper administration of justice. Parties to the proceedings must thus expect that, on the basis of the established and plainly relevant facts, any decision may go against them. It can further be inferred from this that a decision may be based on a ground or arguments discussed for the first time during oral proceedings and which would prevent the patent being maintained, at least if the stage reached is such that the absent - albeit duly summoned - appellant (proprietor) could have expected the question to be discussed and was aware from the proceedings to date of the actual bases on which it would be judged (see decision T 341/92, OJ EPO 1995, 373).

8.1 The requirements set forth above are fulfilled in the present case. The decision to dismiss the appeal is

entirely based on grounds, facts and evidence which were already known to the appellant from the proceedings before the opposition division and which were again brought to the appellant's attention in writing during the appeal proceedings. Furthermore, the appellant availed itself of the opportunity to comment either in writing or during oral proceedings on the respondent's reply to the statement of the grounds of appeal mailed to the appellant by registered letter as early as 24 August 1998 for proper consideration.

- 8.2 On the basis of the above considerations, the board is of the opinion that, in the circumstances of the present case, considering and deciding in substance on the dismissal of the appeal does not conflict with the conclusions of the Enlarged Board of Appeal in decision G 4/92 and does not contravene the appellant's procedural rights as laid down in Article 113(1) EPC, in spite of its absence during oral proceedings.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

A. Townend

U. Oswald