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**Datasheet for the decision  
of 17 June 2015**

**Case Number:** T 2328/12 - 3.3.06

**Application Number:** 07796963.2

**Publication Number:** 2066774

**IPC:** C11D3/02

**Language of the proceedings:** EN

**Title of invention:**

WAREWASHING COMPOSITION FOR USE IN AUTOMATIC DISHWASHING  
MACHINES, AND METHOD FOR USING

**Applicant:**

ECOLAB INC.

**Headword:**

Warewashing Composition/Ecolab Inc.

**Relevant legal provisions:**

EPC Art. 52(1), 56, 84, 111(1), 123(2)

**Keyword:**

New Main Request occasioned by the debate at the oral proceedings - admitted  
Amendments - added subject-matter (no)  
Inventive step - non-obvious solution

**Decisions cited:**

**Catchword:**



**Beschwerdekammern  
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Case Number: T 2328/12 - 3.3.06

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.06**  
**of 17 June 2015**

**Appellant:**  
(Applicant)

ECOLAB INC.  
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**Representative:**

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**Decision under appeal:**

**Decision of the Examining Division of the  
European Patent Office posted on 16 July 2012  
refusing European patent application No.  
07796963.2 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman**

P. Ammendola

**Members:**

G. Santavicca

S. Fernández de Córdoba

## **Summary of Facts and Submissions**

- I. The appeal lies from the decision of the Examining Division to refuse the European patent application no. 07 796 963.2.
- II. In the decision under appeal, the Examining Division came to the conclusions
  - a) that the subject-matter of Claims 1 and 15 of the Main Request lacked an inventive step over the disclosure of D4 (US2006/069005), taken as the closest prior art, in combination with the teaching of D1 (WO2006/011934); and
  - b) that this conclusion also applied to the claimed subject-matter according to First to Fifth Auxiliary Requests.
- III. With its statement setting out the grounds of appeal, the Applicant (hereinafter the Appellant) resubmitted the six sets of amended claims which were then pending before the Examining Division, as its Main Request and First to Fifth Auxiliary Requests respectively.
- IV. In a communication in preparation for the oral proceedings, dated 8 June 2015, the Board provided its preliminary and non-binding opinion on the allowability under Articles 123(2) and 84 EPC of some amendments in Claim 1 of the auxiliary requests and on the invoked improvement over D4 in support of inventive step.
- V. With letter dated 11 June 2015, the Appellant filed six sets of amended claims labelled Main Request and First to Fifth Auxiliary Requests. The Main Request and First to Fifth Auxiliary Requests filed with the statement setting out the grounds of appeal were respectively renumbered as Sixth to Eleventh Auxiliary Requests.

VI. Oral proceedings were held on 17 June 2015. The debate initially focused *inter alia* on the issue of inventive step over D1, taken as the closest prior art, in combination with D4, as regards the option "*Aluminium and Magnesium*" defined in Claim 1 according to the Main Request. In reaction thereto, the Appellant submitted a set of Claims 1 to 11 as its Main Request (hereinafter "the Main Request") and withdrew all of the claim requests on file. The amendments in the claims of the sole final claim request and inventive step of its claimed subject-matter were then discussed.

VII. The independent claims of the Main Request respectively read as follows:

*"1. A warewashing detergent composition comprising:*  
*(a) a cleaning agent comprising a deterative amount of a surfactant;*  
*(b) an alkaline source in an amount effective to provide a use composition having a pH of at least about 8 when measured at a solids concentration of about 0.5 wt.%; and*  
*(c) a corrosion inhibitor in an amount sufficient for reducing corrosion of glass when the warewashing detergent composition is combined with water of dilution at a dilution ratio of dilution water to detergent composition of at least about 20:1, wherein the amount in the use composition is about 6 to about 300 ppm, the corrosion inhibitor comprising:*  
*(i) a source of aluminum ion; and*  
*(ii) a source of calcium ion,*  
*wherein the warewashing composition is provided in the form of a solid, a gel or a paste, and*  
*wherein the corrosion inhibitor comprises a calcium/aluminium corrosion inhibitor having a molar ratio of*

*calcium ion to aluminium ion of less than about 1:4 or a molar ratio of calcium ion to aluminum ion of greater than about 2:1."*

*"11 . A method for using a warewashing detergent composition according to any of claims 1 to 10, the method comprising diluting the warewashing detergent composition with water at a dilution ratio of water to warewashing detergent composition of at least about 20:1."*

VIII. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of Claims 1 to 11 according to the Main Request filed during oral proceedings.

IX. The arguments of the Appellant of relevance for the present decision can be summarised as follows:

*Admissibility of the Main Request filed at the oral proceedings*

Since the submission of the Main Request was in reaction to the communication by the Board and the debate during the oral proceedings, and overcame the raised objections, it was admissible.

*Allowability of the amendments*

The amended claims were based on the claims as originally filed. Claim 1 was a combination of Claims 1 and 17 as originally filed with the inclusion of the range of the amount of the corrosion inhibitor as disclosed in the application as filed. Therefore, the claims complied with Article 123(2) EPC.

*Novelty*

The subject-matters of the claims of the Main Request were more restricted than those of the claims pending before the Examining Division, for which novelty had been acknowledged in the decision under appeal. So no objection against novelty arose.

*Closest prior art*

Although both D1 and D4 pertained to the same technical field, the closest prior art was disclosed in D1 rather than in D4. In fact, D1 not only addressed the typical glass corrosion problems (leaching out of minerals and redeposition of silicates), also addressed in D4, but aimed at providing a sacrificial layer, as the present application, in order to prevent etching of minerals and silicates redeposition. Instead, D4 aimed at high amounts of particular surfactants.

The claimed subject-matter was distinguished from D1, the closest embodiment of which was defined in its Claim 1, in that the binary system Al/Zn of D1 was replaced with a binary system Al/Ca, whereby the ratio Al/Ca could be adjusted to cope with different water hardnesses.

*The technical problem*

Although the application as filed did not contain any general statements on improvements arising from the use of the system Al/Ca, this system provided improvements not only over a system that did not contain any corrosion inhibitor but also over a system containing zinc as corrosion inhibitor. This fact was apparent from Tables 3 and 4 of the application as filed, in particular from the comparison between a system containing Al/Zn and a system containing Al/Ca. This

comparison was credible despite the fact that many other parameters of the two compositions had been changed, as it made apparent for the first time that calcium had a positive effect on glass corrosion inhibition if purposively added to the concentrate.

*The solution and its success*

The solution as defined in Claim 1 made clear that there should be a controlled amount of a corrosion inhibitor comprising calcium and aluminum at specific molar ratios. These features resulted in the controlled formation of a thin sacrificial layer of calcium aluminate, which prevented minerals etching and redeposition of silicate layers on the glass surface.

*Non obviousness*

Although some data about calcium were mentioned in D1, this mention did not concern the purposive addition of calcium as one of the components of the concentrate, let alone in order to provide a positive effect on the reduction of glass corrosion, but the assessment of how water hardness worked in the diluted composition in use. This influence of water hardness was particularly reflected in the ternary plots shown in D1. Since D1 did not hint at the purposive addition of Ca as a component of the concentrate composition, it did not teach to replace the system Al/Zn with a system Al/Ca.

D4 was silent in respect of the purposive addition of Ca as a component of the concentrate in order to reduce glass corrosion.

Therefore, the claimed composition was not obvious.

In fact, as apparent from the disclosures of D1 and D4, the claimed composition would not be obvious over D1 and D4 even if the addressed problem were the providing of a further composition with glass corrosion inhibition.

## **Reasons for the Decision**

### *Admissibility of the Main Request filed at the oral proceedings*

1. The filing of the Main Request during the oral proceedings before the Board was in reaction to objections raised for the first time by the Board in its communication dated 8 June 2015 and further clarified during the debate at the hearing. Since the Main Request addresses and overcomes these objections without raising questions which could not be dealt with during the oral proceedings, the Board exercised its discretion (Article 13(1)(3) RPBA) and decided to admit the Main Request into the appeal proceedings.

### *Allowability of the amendments*

2. The claims of the Main Request are indisputably based on Claims 1 and 17 of the application as filed, with the further limitations "*wherein the amount in the use composition is about 6 to about 300 ppm*" and "*wherein the warewashing composition is provided in the form of a solid, a gel or a paste*". These further limitations are respectively disclosed on pages 17 (paragraph [0043]) and 6 (paragraph [0017], last three sentences) of the original application as published, i.e. as being generally applicable to all of the claimed concentrates, or diluted solutions therefrom. Since the



amended claims are also clear, the Main Request is formally allowable under Articles 84 and 123(2) EPC.

*Novelty*

3. The novelty of the claimed subject-matter of then pending claim requests was acknowledged in the decision under appeal (Reasons, 9). The claims according to the Main Request are more restricted than those of the then pending claims. So the Board has no reason to take a different stance on novelty. The distinguishing features over the cited prior art will become apparent from the following decision on inventive step.

*Inventive step*

*The invention*

4. The present invention concerns warewashing compositions for use in automatic dishwashing machines and methods for using the warewashing composition in automatic dishwashing machines, whereby the composition includes a corrosion inhibitor to reduce corrosion of glass, which corrosion inhibitor comprises at least aluminium and calcium (application as filed, paragraph [0001]).

*The closest prior art*

5. At the oral proceedings before the Board, the Appellant argued that D1 rather than D4 was the closest prior art document for assessing inventive step of the subject-matter of Claim 1 of the Main Request according to the problem-solution approach.
  - 5.1 It is established case law of the boards of appeal of the EPO (7th edition 2013, I.D.3.1) that the closest

prior art for assessing inventive step is normally a prior art document disclosing subject-matter conceived for the same purpose or aiming at the same objective or addressing the same technical problem as the claimed invention and having the most relevant technical features in common, i.e. requiring the minimum of structural modifications.

5.2 For the reasons given in the following, the Board accepts that D1 is the closest prior art.

5.3 Ad similarity of objectives/problems

5.3.1 The present application as filed (see Paragraphs [0004] and [0012] in the published version) not only addresses the generally known glassware corrosion problems related to leaching out of mineral from the glass composition, hydrolysis of the silicate network and redeposition of silicate material onto the glass, which result in the cloudy appearance of filming on glassware that has been washed repeatedly in dishwashing machines. In fact, the present application as filed (paragraph [0031], page 12, lines 1-14) also addresses the corrosion problem due to thick filming from relatively rapid deposition of aluminium precipitates, which according to Paragraph [0035] are due to the presence of hard water where free calcium ions are available for precipitation with aluminium, eg as calcium aluminate. This is a further corrosion problem, which evidently requires a further solution.

5.3.2 D1, as the present application, addresses both problems (see page 2, lines 4-10, as well as page 3, lines 15-21, and the sentence bridging pages 5 and 6).

- 5.3.3 Instead, D4 deals with the known corrosion problems related to leaching out of mineral from the glass composition, hydrolysis of the silicate network and redeposition of silicate material onto the glass (Paragraph [0003]) but does not address specifically the thick filming from precipitates in the presence of hard water where free calcium ions are available for precipitation with aluminium. In Paragraph [0021], D4 generally mentions a control of unwanted precipitates in the wash liquor, not however the specific thick filming addressed in the patent in suit and in D1.
- 5.3.4 Therefore, D1 has more objectives in common with and addresses more glass corrosion problems as the present application than D4, which thus has less similarity of objectives with the present application.
- 5.3.5 Since in selecting the closest prior art the first consideration should be given to the similarity of purpose, objective and problem addressed, i.e. more weight should be given to purpose, objective and problem than to the maximum number of common features (case law, *supra*), D1 rather than D4 is the closest prior art for assessing inventive step according to the problem-solution approach.
- 5.3.6 However, in the present case, D1 has also more features in common with the claimed subject-matter than D4.
- 5.4 Ad similarity of relevant technical features
- 5.4.1 D1 (see Claims 1, 16, 35) discloses all of the features of Claim 1 of the Main Request apart the source of calcium ion and the ratio between calcium and aluminium.

- 5.4.2 Instead, D4 does not disclose the specific amount of 6 to 300 ppm of corrosion inhibitor in the use solution, nor the minimum dilution ratio, and does not contain the same definition of alkalinity source.
- 5.4.3 The sole mentioned reduction of glass corrosion due to unwanted precipitates in the wash liquor in D4 (page 11, lines 13-14) is to be obtained with insoluble salts. There is no preference whatsoever for water soluble aluminium salts, let alone aluminates.
- 5.4.4 Hence, there is also less commonality of features between the composition defined in Claim 1 at issue and those described in D4 than those described in D1.
- 5.5 D1 is definitely the best starting point for assessing inventive according to the problem solution approach.

*The relevant disclosure of D1*

6. D1 (Claim 1) discloses a warewashing detergent composition comprising:
- (a) a cleaning agent comprising a deterative amount of a surfactant;
  - (b) an alkaline source in an amount effective to provide a use composition having a pH of at least about 8 and obtained by diluting the warewashing detergent composition with water; and
  - (c) a corrosion inhibitor in an amount sufficient for reducing corrosion of glass, the corrosion inhibitor comprising: (i) a source of aluminum ion; (ii) a source of zinc ion; and (iii) wherein the source of aluminum ion and the source of zinc ion are present in amounts sufficient to provide a use composition having a weight ratio of zinc ion to aluminum ion of at least about 2:1.

- 6.1 The source of aluminum ion can comprise sodium aluminate (Claim 10). The amount of corrosion inhibitor sufficient for reducing corrosion of glass can provide a concentration of from 6 to 300 ppm (Claim 16).
- 6.2 The warewashing detergent composition of D1 can be provided in the form of a liquid (Claim 33), whereby pastes and gels can be considered as a type of liquid (page 7, lines 17-19; Page 30, lines 5-6), or in the form of a solid (Claim 34).
- 6.3 D1 (see Claim 35), also discloses a method for using a warewashing detergent composition, which comprises the step of diluting a warewashing detergent composition with water at a dilution ratio of water to warewashing detergent composition of at least about 20:1.
- 6.4 The combined subject-matter of said claims (also disclosed in D1, Summary of the invention and page 7, lines 17-20) is the closest prior art to the claimed subject-matter of the sole claim request at issue.

*The technical problem according to the appellant*

7. At the oral proceedings before the Board, the Appellant maintained that, starting from this prior art, the technical problem was the providing of a warewashing composition with improved glass corrosion inhibition, compared to the composition of D1.

*The solution*

8. The patent application as amended proposes to solve this problem by a corrosion protection agent for treating glassware surfaces as defined in Claim 1 at

issue, which is characterized in that it comprises "an effective amount of corrosion inhibitor comprising:  
(i) a source of aluminum ion; and  
(ii) a source of calcium ion,  
wherein the corrosion inhibitor comprises a calcium/aluminium corrosion inhibitor having a molar ratio of calcium ion to aluminium ion of less than about 1:4 or a molar ratio of calcium ion to aluminum ion of greater than about 2:1".

*The alleged success of the solution*

9. As regards the better results allegedly achievable by the claimed warewashing composition in comparison to the composition of D1, the Appellant exclusively relied on the results provided in Table 4 for the compositions described in Table 3 of the application as filed, which are supposed to show that less silicon is removed from glass if calcium (invention) instead of zinc (D1) is used together with the same amount of aluminium as the corrosion inhibitor couple.
- 9.1 However, the tested compositions are very specific and differ from each other not only in the calcium or zinc ion, but in many other compositional aspects, apart from the same amount of sodium aluminate. So it is not clear that the showed improvement is only related to the different metal ion used, namely aluminum/calcium instead of aluminium/zinc.
- 9.2 Also, D1 is not acknowledged in the application as filed, i.e. was not taken into account when the problem was formulated. Nor does the application as filed contain any general statements that the claimed compositions are generally better than those based on aluminium/zinc.

9.3 As D1 too addresses a problem of glass corrosion prevention, which it solves by the use of Al and Zn, in the absence of any comparative evidence on file showing any whatsoever better performance of the claimed composition over the composition of D1 across the whole breadth of Claim 1 at issue, the disclosure provided in the application is found insufficient at rendering plausible the improvement invoked by the Appellant.

9.4 Therefore, the Board cannot accept as plausible that the ambitious problem of providing an improvement over D1 is effectively solved by the corrosion protection composition according to Claim 1 at issue.

*Reformulation of the technical problem*

10. Since the problem effectively solved cannot be formulated in terms of an improvement over the closest prior art D1, it has to be reformulated in a less ambitious way.

In line with paragraphs [0008] and [0014] of the application as filed, which do not mention an improvement over compositions containing corrosion inhibitors such as Al/Zn, and the fall back position held by the Appellant during the oral proceedings, it can be seen in the providing of further warewashing compositions for treating glassware surfaces providing good glass corrosion inhibition.

*Success of the claimed solution in respect of the reformulated technical problem*

11. Considering that:

- (a) already the fact that claim 1 requires the presence of sources of Ca and Al ions in the concentrate and that the corrosion inhibitor (whose amount in the claimed warewashing composition is indirectly set by giving the amount range for the inhibitor in the use composition) comprises a calcium/aluminium corrosion inhibitor, necessarily implies that these elements will inevitably also be present in the use composition in amounts apt at appreciably contributing to the corrosion inhibition;
- (b) the further requirements in claim 1 as to unbalanced calcium to aluminium molar ratios renders plausible a controlled deposition of a **thin** film that protects the glass from corrosion, whilst preventing precipitation of a thicker visible film (paragraphs [0031], [0033] and [0035] of the application as filed) (in this respect, D1 too shows - ternary plots - that the ratio Al/Ca is crucial to precipitation);
- (c) the results in Table 4 of the application as filed show that the use of aluminium and calcium at one of these unbalanced molar ratios is at least actually comparable to the use of aluminium and zinc, as used in D1; and, that,
- (d) there is no apparent reason to doubt that a comparable glass corrosion inhibition also applies to the other part of Claim 1 at issue not represented by the examples,

the Board accepts it as plausible that the less ambitious problem is effectively solved by the warewashing composition according to Claim 1 at issue.

*Obviousness*



12. It remains to be decided whether the claimed solution was obvious for the skilled person starting from the closest prior art D1 with the aim to solve the problem posed, using common general knowledge and considering the teachings of the prior art relied upon by the Appellant. More particularly, whether the person skilled in the art starting from the prior art D1 would conceive adding calcium to the concentrate in the expectation that it would not be detrimental, but that it would contribute, to the glass corrosion inhibition.
- 12.1 The corrosion inhibitor disclosed by D1 indisputably includes a source of aluminium ion and a source of zinc ion (page 3, line 7-8; page 6, lines 21-24; Claim 1; Tables 3, 5, 7, 9 and 11-14).
- 12.1.1 There is also a disclosure concerning calcium in D1 (Sentence bridging pages 5 and 6; first full sentence on page 6; paragraph bridging pages 8 and 9; paragraph bridging pages 12 and 13; paragraph bridging pages 13 and 14; particularly, page 14, lines 1-6, and page 15, lines 5-9; page 27, lines 22-24; Examples 14 and 15; Figures 5 and 6, ternary plots of sodium aluminate, zinc chloride and calcium chloride). However, this disclosure merely addresses the problems created by the free calcium available in the use composition and provided by the water hardness. Examples 14 and 15 of D1 concern the qualitative and quantitative measure of film formation and glass etching on glass vials, when a ternary mixture containing varying amounts of zinc chloride, sodium aluminate and calcium chloride is used, which is not however a concentrate according to D1. According to D1 (sentence bridging pages 46 and 47), the experiments serve the purpose to determine the optimum ratio of aluminium and zinc in order to provide minimal deposition of visible film.

12.1.2 Therefore, the disclosure of D1 actually represents a disincentive for the skilled person, as it runs against the purposive addition of calcium to the concentrate.

13. D4 (Claim 1) discloses an automatic dishwashing detergent composition comprising:  
a) an effective amount of a polyvalent metal compound;  
b) at least 8%, by weight, of a low-foaming, nonionic surfactant having a cloud point less than about 32°C.;  
and  
c) optionally, at least one adjunct ingredient.

13.1 In the composition of D4, the polyvalent metal compound can be a metal selected from the group consisting of Al, Mg, Co, Ti, Zr, V, Nb, Mn, Fe, Co, Ni, Cd, Sn, Sb, Bi, Zn, and mixtures thereof (Claim 3). Hence, calcium is clearly not envisaged by D4.

13.2 There are nevertheless two instances in D4 in which calcium is mentioned:  
(a) One (Paragraph [0018]; Claim 5) mentions magnesium calcium chloride in a long list of suitable water-soluble magnesium salts; and,  
(b) the other (paragraph [0041]) is in connection with co-surfactants having good solubility in the presence of calcium, which evidently refers to the diluted composition containing free calcium from the water hardness.

However, D4 gives no particular significance to magnesium calcium chloride. Moreover, D4 prefers the insoluble magnesium salts (Paragraphs [0020] and [0021]).

13.3 Therefore, D4 does not suggest either a purposive use of calcium in the concentrate composition which is not detrimental to glass corrosion inhibition.

*Conclusion*

14. The claimed subject-matter of the Main Request submitted at the oral proceedings before the Board is not rendered obvious by D1 and D4, so that this claim request fulfils the requirements of the EPC.

15. Consequently, the Main Request is allowable.

*Remittal*

16. The claims have been substantially changed. The description needs to be adapted to the new claims. It is thus appropriate to remit the case.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to grant a patent with the Claims nos. 1 to 11 according to the request filed during the oral proceedings and a description to be adapted thereto.

The Registrar:

The Chairman:



D. Magliano

P. Ammendola

Decision electronically authenticated