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# D E C I S I O N
## of 23 May 2002

**Case Number:** T 0626/98 - 3.3.6

**Application Number:** 94931107.0

**Publication Number:** 0726939

**IPC:** C11D 11/00

**Language of the proceedings:** EN

**Title of invention:**
Process for the production of a detergent composition

**Applicant:**
UNILEVER PLC, et al

**Opponent:**
-

**Headword:**
Predetermined relative humidity/UNILEVER

**Relevant legal provisions:**
EPC Art. 56

**Keyword:**
"Inventive step (no) - obvious alternative in the light of the common general knowledge of the skilled person"

**Decisions cited:**
-

**Catchword:**
-

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Case Number: T 0626/98 - 3.3.6

# D E C I S I O N
## of the Technical Board of Appeal 3.3.6
## of 23 May 2002

Appellant: UNILEVER PLC
Unilever House
Blackfriars
London EC4P 4BQ (GB)

and

UNILEVER N.V.
Weena 455
NL-3013 AL Rotterdam (NL)

Representative: Fransella, Mary Evelyn
Unilever PLC
Patent Division
Colworth House
Sharnbrook
Bedford MK44 1LQ (GB)

Decision under appeal: Decision of the Examining Division of the European Patent Office posted 5 February 1998 refusing European patent application No. 94 931 107.0 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: P. Krasa
Members: L. Li Voti
C. Holtz

## Summary of Facts and Submissions

I. This appeal lies from the decision of the Examining Division to refuse European patent application No. 94 931 107.0, relating to a process for the production of a detergent composition having a predetermined relative humidity, for lack of an inventive step of the claimed subject-matter.

II. In its decision the Examining Division referred inter alia to the following documents:

(2): WO-A-92/01036

(7): "Unit Operations of Chemical Engineering" by W.L. McCabe and J.C. Smith, International Student ed., 1956, pages 885 to 887

(8): "Trocknungstechnik", 2nd volume, by K. Kröll: Trockner und Trocknungsverfahren, 2nd ed. 1978, page 40

The Examining Division found that the claimed invention did not fulfill the patentability requirements of the EPC and in particular that the claimed subject-matter did not involve an inventive step over the above cited prior art.

In particular document (2) disclosed a process differing from that claimed in the present application only insofar as the gas had not been dried prior to the contacting step with the detergent composition in the fluidized bed. However, since it was known to the skilled person from document (8) that such a preliminary drying step of the gas would allow an acceptable drying rate also at lower temperatures, it would have been obvious to apply this preconditioning

step to the process known from document (2) in order to lower the gas and the detergent powder temperatures during drying and to avoid therewith an undesirable agglomeration of the detergent granulate.

III. An appeal was filed against this decision.

In the communications of 26 January 2001 and 25 July 2001 the Board informed the Appellants and Applicants of its provisional opinion and cited the following additional document:

(11): Trocknungstechnik, 2nd volume, by K. Kröll: Trockner und Trocknungsverfahren, 2nd ed. 1978, pages 67 to 68, 111 to 115, 118, 145 to 146, 228 to 234.

The Board stated in particular that it was known to the skilled person from his common general knowledge of the drying technique in a fluidized bed, as represented in documents (8) and (11), that a more efficient drying of a given material could be achieved not only by increasing the gas temperature but also by reducing such temperature and using a gas dried to a larger extent. Therefore it was obvious to use the latter process step alternatively to the former disclosed in document (2).

IV. Subsequently to these communications the Appellants filed an amended set of 11 claims, claim 1 of which had the following wording:

"1. A process for the production of a detergent composition having a predetermined relative humidity as determined at 20 °C and 1 atmosphere pressure comprising (i) forming a crude detergent composition having a relative humidity in excess of te predetermined level,

(ii) feeding the said crude composition into a fluid bed,
(iii) contacting said crude composition in the fluid bed with a preconditioned gas stream the gas which has been dried prior to the contacting step and which has a relative humidity below the predetermined relative humidity,
wherein the velocity of the preconditioned gas is in the range 0.3 to 1.5 m/s, the preconditioned gas is introduced at a temperature not in excess of 95 °C, and the crude composition is maintained below the temperature at which the crude composition agglomerates and not in excess of 60 °C, thereby to form detergent composition with a relative humidity of 30% or less."

The dependent claims 2 to 11 related to particular embodiments of the claimed process.

V. During the oral proceedings held before the Board on 23 May 2002 the Appellants modified the wording of item (iii) of claim 1 into "...a preconditioned gas stream, **the gas of which** has been dried prior to the contacting step,..." (emphasis added by the Board) and filed an auxiliary request comprising ten claims, claim 1 of which differed from that of the main request insofar as it contained at the end the following additional wording:

"which further comprises the step of admixing the detergent composition having a predetermined relative humidity as determined at 20 °C and 1 atmosphere pressure with a bleach system.".

VI. The Appellants submitted in essence that

- document (2) represented a suitable starting point for assessing the inventiveness of the claimed subject-matter;

- this document suggested to reduce the water content of detergent particles in order to prevent their agglomeration during drying in a fluidized bed and did not mention the technical problem of reducing fouling in a fluid bed dryer nor the importance of achieving a predetermined relative humidity;

- moreover, contrarily to the claimed invention, it taught to increase the gas temperature in order to lower the moisture content of the detergent powder and shorten the drying time or to coat it additionally in order to prevent its agglomeration;

- documents (8) and (11) did not teach that the combination of preliminary drying of the treating gas, control of the temperature of the detergent powder and control of the treating gas flow rate were necessary for solving the technical problem dealt with in the present application;

- in particular the skilled person would not have expected that the reduction of the drying velocity caused by the use of a lower drying temperature could be sufficiently compensated by using a gas dried to a larger extent and it was thus surprising that the drying of a detergent composition to the desired relative humidity level could be achieved in a reasonable time;

- the saving in terms of processing time and energy provided by the claimed process were thus surprising in the light of the teaching of the prior art.

With respect to the auxiliary request the Appellants argued additionally that document (2) did not recognise the importance of a low relative humidity in order to avoid the destabilization of a bleaching component admixed to the dried detergent composition and in fact taught away from admixing a bleach to the dried granulate.

VII. The Appellants request that the decision of the Examining Division be set aside and that a patent be granted on the basis of the claims according to the main or the auxiliary request, both of them filed during oral proceedings.

## Reasons for the Decision

1. The Board is satisfied that the claims according to the main and to the auxiliary requests comply with the requirements of Articles 123, 84 and 54 EPC.

2. *Inventive step (main request)*

2.1 Most suitable starting point and technical problem

2.1.1 The present application, in particular claim 1, relates to a method for reducing the relative humidity of a detergent powder by treatment with a gas stream at a temperature below that at which the granular composition agglomerates (page 2, lines 23 to 33 - all references herein being to the application as originally filed).

According to the present application, the drying of a detergent powder in a fluidized bed at elevated temperatures can render some of its components excessively sticky or fluid so that some particles may associate into a larger mass, thus producing undesired agglomeration of the product and fouling of the apparatus with a consequent decrease of the efficiency of the process and a possible interruption of the same for the cleaning of the apparatus (see page 2, lines 1 to 15 and page 3, lines 27 to 33).

The technical problem specifically addressed in the application as filed consists thus in the reduction of undesirable agglomeration of a detergent product during its drying in a fluidized bed.

2.1.2 Document (2) discloses a method for drying a detergent product in a fluidized bed, wherein the product is treated with air so that its temperature preferably does not exceed 75°C and undesirable agglomeration is prevented (see claim 1; page 5, last full paragraph and page 6, second full paragraph).

As shown in Examples 1 and 2 of this document the resulting dried granulate is free-flowing and the drying process can be repeatedly carried out without any agglomeration and therefore without any fouling of the fluidized bed.

As also agreed by the Appellants, the Board thus takes document (2) as the most suitable starting point for the assessment of the inventiveness of the claimed subject-matter.

Since the process known from document (2) already provided drying without any undesirable agglomeration of the detergent product and fouling of the drying apparatus, the technical problem underlying the present

application should be more appropriately reformulated as the provision of an alternative drying process which allows the drying of a detergent powder to the desired relative humidity without agglomeration and without an unacceptable increase of the drying time as compared with that disclosed in document (2).

2.1.3 As explained in the present application, the claimed solution of this technical problem, i.e. the use of a gas dried to a larger extent before contacting with the material to be dried, allows the use of a lower drying temperature than that used specifically in document (2) and thus avoids undesirable agglomeration of the product (see page 4, lines 1 to 5 and page 7, lines 21 to 32); moreover, the use of the selected gas velocity provides an efficient drying (see page 8, lines 4 to 9).

The illustrative example contained in the present application further shows that drying to the desired relative humidity at a temperature below 50°C is achieved within 15 minutes.

The Board has thus no reason to doubt that the underlying technical problem mentioned above has been convincingly solved by a process according to claim 1.

2.2 Evaluation of inventive step

2.2.1 According to Example 1 of document (2) a detergent granulate comprising an anionic surfactant and zeolite is dried in a fluidized bed with air having an inlet temperature of 70°C. The resulting granulate is free-flowing.

The temperature of the granulate of Example 1 during drying must thus be necessarily below 70°C, since it was common general knowledge at the priority date of

the present application that in a convection drying process, such as in a fluidized bed, the dried material maintains a lower temperature than the environment (in this case the treating gas) whilst releasing humidity and reaches the temperature of the environment only at the end of the process (see document (11), second and third full paragraph under the heading 1.2.3 on page 67).

Moreover, the temperature of the treated granulate in Example 1 must be also below the temperature at which agglomeration occurs, since the resulting product is free-flowing.

Furthermore, as already recognised by the Examining Division (page 4 of the grounds for the decision), the gas used in document (2) must necessarily possess a relative humidity below the so-called predetermined relative humidity, i.e. the relative humidity of the resulting dried product, since otherwise it would not be able to dry the treated granulate (see in this respect document (7), passage on page 886 below Figure 16-12 and page 887, lines 4 to 10).

The products of document (2) are moreover preferably dried up to the removal of all the free water (see page 5, lines 20 to 22 and page 11, last five lines) and the resulting material contains therefore only bound water which can be released by treatment at high temperature.

Since the relative humidity of a material is a measure of the activity of its free water content in a solid material under the conditions of 1 atmosphere and 20°C as explained in the present application (page 6, lines 3 to 11), products containing only bound water, i.e. water which cannot be released at 20°C and 1 atmosphere, would thus necessarily show a very low

relative humidity. The products of Example 1 and especially the embodiments carried out at higher temperatures must thus have in the Board's view a very low relative humidity of less than 30% as required by claim 1 of the present application.

Finally, even though document (2) suggests for a particular embodiment to coat a detergent granulate which can be expected to be sticky in order to avoid its agglomeration during drying (page 6, first paragraph), this teaching applies only to those granulates which comprise very high amounts of anionic surfactants and thus cannot be processed without coating (see page 9, last 6 lines). This is, however, not the case for the granulates of Examples 1 and 2 comprising lower concentrations of surfactants.

Therefore, the subject-matter of claim 1 differs from the process disclosed in Example 1 of document (2) only insofar as:

- the treating gas is dried to a larger extent before contacting the detergent granulate;

- the temperature of the detergent granulate is maintained during drying at a temperature not exceeding 60 °C;

- and the velocity of the treating gas is specified to be from 0.3 to 1.5 m/s.

2.2.2 The Appellants argued that the claimed process provided drying to the desired relative humidity at a lower temperature than that used in document (2) and within a reasonable time, whilst document (2) suggested to increase the temperature of the treating gas for achieving a reduced water content and shortening the drying time. This was shown in Example 1 of this

document wherein an increase of the air temperature from 70 to 150°C reduced the drying time from 60 to 10 minutes and the water content from 7.7 to less than 1% by weight.

Moreover the skilled person, knowing that a reduction of the air would imply an increase of the drying time, would not have expected a further drying of the gas to be sufficient for achieving the desired relative humidity, if at all, within a reasonable time.

With regard to the selected gas velocity the Appellants agreed during oral proceedings that the selection of the gas velocity did not contribute in an unexpected way to the solution of the underlying technical problem and that the skilled person was able to select the best gas velocity for a given process on the basis of his common general knowledge. This is confirmed in the Board's view by document (11) (page 230, last full paragraph and page 234, paragraph 1) according to which teaching the air speed in a fluidized bed dryer must be sufficient for building the "fluidized bed", but it should not be so high that fine particles are carried out and thus removed. This technical feature can thus be disregarded for the assessment of an inventive step of the claimed subject-matter.

2.2.3 The Board finds thus that the question to be answered in the present case for the assessment of an inventive step of the claimed subject-matter is whether a skilled person, making use of his common general knowledge in the field of drying operations in a fluidized bed, would have alternatively used a lower air temperature and a gas dried to a larger extent in a process as disclosed in Example 1 of document (2) and would have expected to achieve therewith the desired drying within a reasonable time.

As already pointed out in the decision of the Examining Division (page 5 of the grounds for the decision) it was common general knowledge at the priority date of the present application that by drying the air to a larger extent and thus by reducing its vapour partial pressure and consequently its relative humidity in the dryer, the treated material would release the therein contained humidity **sufficiently rapidly** also at a lower temperature (see document (8), paragraph 1.1.3.1 on page 40).

The Board agrees with the Appellants that general principles of drying techniques may not apply to any type of dryer as suggested on page 885 of document (7); however, the principle enounced in document (8) applies also to convection dryers and thus also to fluidized bed dryers, which are a type of such dryers (see document (11), pages 111 to 112). Moreover this principle is supported by the teaching of document (11) explaining that **more humidity per time unit** can be removed from the treated good in a convection drying process by either increasing the air temperature (as carried out in Example 1 of document (2)), or using air having a lower vapour partial pressure (page 115, lines 10 to 15 and page 68, the paragraphs below Figure 1.59).

Document (11) further reports that the drying speed can be increased in such a drying process by reducing the relative humidity of the treating air (see paragraph 2.3.1.1.9 and Figure 2.21 on pages 145 and 146), the drying speed being proportional to the difference of the vapour partial pressure of the material to be dried and that of the gas (see also document (11), equations 2.8 and 2.8a on page 115).

2.2.4 Therefore, the Board comes to the conclusion that in order to achieve the desired drying degree within a reasonable time, it was obvious to the skilled person in the light of his common general knowledge of drying operations in a fluidized bed to dry the air preliminarily to a larger extent as alternative to increasing its temperature, as carried out in Example 1 of document (2). This known technical step allows, as taught in documents (8) and (11), the maintenance of lower temperatures for the treated granulate, the choice of the best temperature being only a matter of routine optimisation in dependence of the type of granulate to be treated.

Therefore, the Board considers the subject-matter of claim 1 to lack an inventive step; the main request has thus to be rejected.

3. *Inventive step (auxiliary request)*

The subject-matter of claim 1 of the auxiliary request differs from that of claim 1 of the main request insofar as it additionally requires the admixing of the dried granulate with a bleaching component.

The Appellants argued that document (2) taught away from admixing a bleach to the dried granulate and had not recognised the importance of a low relative humidity of the detergent composition to be admixed with the bleaching component.

The Board cannot accept this argument for the following reason:

- document (2) provides dried detergent compositions having already a very low relative humidity, as explained above in point 2.2.1; therefore, if the skilled person would have to consider stability

problems caused by the interaction of humidity present in the detergent composition with sensitive components (e.g. peroxides), such problems were already solved by the teaching of document (2);

- this citation further indicates in the last three lines of page 6 that particularly temperature sensitive components such as bleaches were not important for the process disclosed therein. This remark suggests thus in the Board's view not to add such bleaching components during the therein disclosed drying process (see page 6, last three lines).

Therefore the Board comes to the conclusion that it was obvious to the skilled person to add such temperature sensitive components (which are usual part of a fully formulated detergent composition) to the dried granulate obtained following the process of document (2) and that no contribution to inventive step can be recognised for this additional step.

Therefore the Board finds that the subject-matter of claim 1 of the auxiliary request does not involve an inventive step and that this request has also to be rejected.

## Order

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

The appeal is dismissed.

The Registrar: The Chairman:

G. Rauh P. Krasa