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**Datasheet for the decision
of 28 November 2017**

Case Number: T 2094/14 - 3.3.03

Application Number: 10176326.6

Publication Number: 2258773

IPC: C08L63/00, C08L51/04

Language of the proceedings: EN

Title of invention:

Epoxy resin

Applicant:

Kaneka Corporation

Headword:

Relevant legal provisions:

EPC Art. 76(1)

Keyword:

Divisional application - subject-matter extends beyond content of earlier application (yes) all requests

Decisions cited:

T 0823/96

Catchword:



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Case Number: T 2094/14 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 28 November 2017

Appellant: Kaneka Corporation
(Applicant) 2-3-18, Nakanoshima,
Kita-ku,
Osaka (JP)

Representative: Vossius & Partner
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 16 April 2014
refusing European patent application No.
10176326.6 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman D. Marquis
Members: M. C. Gordon
R. Cramer

Summary of Facts and Submissions

I. The appeal lies from the decision of the examining division posted on 16 April 2014 refusing the European Patent Application number EP 10176326.6.

II. The application was a divisional application of EP 04735123.4, claim 1 of which read as follows:

"1. A process for producing an epoxy resin composition having rubber-like polymer particles (B) dispersed in an epoxy resin (A), which comprises bringing an organic medium (C) showing partial solubility in water into contact with an aqueous latex of rubber-like polymer particles (B), then bringing an organic medium (D) having lower partial solubility in water than that of (C) into contact therewith to separate an aqueous layer substantially from the rubber-like polymer particles (B), mixing the resulting dispersion (F) comprising the rubber-like polymer particles (B) and the mixed organic mediums (C) and (D), with an epoxy resin (A), and removing volatile components."

III. Claim 1 of the divisional application as filed which is the subject of this decision read as follows:

"1. An epoxy resin composition comprising an epoxy resin (A) and rubber-like polymer particles (B), in which the rubber-like polymer particles (B) maintain a finely dispersed state of primary particles and the content of the rubber-like polymer particles (B) is 0.5 to 80% by weight when the total amount of the epoxy resin (A) and rubber-like polymer particles (B) is 100% by weight, wherein:
the rubber-like polymer particles (B) are obtainable by graft-polymerizing 5 to 50% by weight of a shell layer

(B-2) with 50 to 95% by weight of a rubber particle core (B-1), and the average particle diameter of the rubber-like polymer particles (B) is 0.03 to 2 µm; and the rubber particle core (B-1) comprises elastic materials composed of not less than 50% by weight of at least one monomer selected from the group consisting of diene monomers and (meth)acrylate monomers and less than 50% by weight of another copolymerizable vinyl monomer, or polysiloxane rubber elastic materials, or a mixture thereof; and

the shell layer (B-2) comprises at least one monomer selected from the group consisting of (meth)acrylates, aromatic vinyls, vinyl cyanides, unsaturated acid derivatives, (meth)acrylamide derivatives and maleimide derivatives; and

the finely dispersed state of primary particles means that the particle dispersion ratio calculated according to the following equation is not less than 90% :

particle dispersion ratio (%) = $(1 - (B1/B0)) \times 100$,
wherein B1 is the number of the rubber-like polymer particles (B) in the form where three or more polymer particles are contacted with one another, and B0 is the total number of rubber-like polymer particles (B)."

IV. The decision of the examining division was based on a main request and two auxiliary requests, all amended compared to the claims of the divisional application as filed.

The main request and first auxiliary request were held not to meet the requirements of Article 76(1) EPC and the second auxiliary request was held not to meet the requirements of Article 54 EPC.

V. Together with the statement of grounds of appeal the appellant submitted sets of claims forming a main request and seven auxiliary requests.

Amended versions of these requests were filed with a letter following receipt of the summons to oral proceedings and communication of the Board.

Claim 1 of the main request read as follows, additions to the request of the application (divisional) as filed being indicated in **bold** deletions in ~~strikethrough~~:

"1. An epoxy resin composition comprising an epoxy resin (A) and rubber-like polymer particles (B), in which the rubber-like polymer particles (B) ~~maintain a finely dispersed state of primary particles~~ **are dispersed in the epoxy resin (A)** and the content of the rubber-like polymer particles (B) is 0.5 to 80% by weight when the total amount of the epoxy resin (A) and rubber-like polymer particles (B) is 100% by weight, wherein:

the rubber-like polymer particles (B) are obtainable by graft-polymerizing 5 to 50% by weight of a shell layer (B-2) with 50 to 95% by weight of a rubber particle core (B-1), and the average particle diameter of the rubber-like polymer particles (B) is 0.03 to 2 μm ; and the rubber particle core (B-1) comprises elastic materials composed of not less than 50% by weight of at least one monomer selected from the group consisting of diene monomers and (meth)acrylate monomers and less than 50% by weight of another copolymerizable vinyl monomer, or polysiloxane rubber elastic materials, or a mixture thereof; and

the shell layer (B-2) comprises at least one monomer selected from the group consisting of (meth)acrylates, aromatic vinyls, vinyl cyanides, unsaturated acid derivatives, (meth)acrylamide derivatives and maleimide derivatives; and

the dispersed state of the rubber-like polymer

particles (B) in the epoxy resin (A) is such that when ~~the finely dispersed state of primary particles means that~~ the dispersed state of the rubber-like polymer particles (B) in the epoxy resin (A) is judged by curing the epoxy resin composition and observing the cured product under a transmission electron microscope by an ultra-thin section method as defined herein, the particle dispersion ratio calculated according to the following equation is not less than 90% : particle dispersion ratio (%) = $(1 - (B1/B0)) \times 100$, wherein B1 is the number of the rubber-like polymer particles (B) in the form where three or more polymer particles are contacted with one another, and B0 is the total number of rubber-like polymer particles (B); and wherein the epoxy resin composition is obtainable by a process which comprises bringing an organic medium (C) showing partial solubility in water into contact with an aqueous latex of the rubber-like polymer particles (B), then bringing an organic medium (D) having lower partial solubility in water than that of (C) into contact therewith to separate an aqueous layer substantially from the rubber-like polymer particles (B), mixing the resulting dispersion (F) comprising the rubber-like polymer particles (B) and the mixed organic mediums (C) and (D) with the epoxy resin (A), and removing volatile components; and which process further comprises bringing a dispersion of rubber-like polymer particles (B) into contact with water at least once after the organic medium (C) showing partial solubility in water is brought into contact with the aqueous latex of rubber-like polymer particles (B) and before the organic medium (D) is brought into contact therewith and/or bringing the dispersion (F) into contact with water at least once before mixing the dispersion (F) with the epoxy resin (A)."

Claim 1 of the auxiliary requests 1-7 differed from claim 1 of the main request in respect of the final feature (indicated in **bold** above), i.e. the treatment of the polymer particles with organic media. The details of these aspects of the auxiliary requests are however not of relevance for the present decision.

- VI. Oral proceedings were held before the Board on 28 November 2017.
- VII. The arguments of the appellant in respect of Article 76(1) EPC for all requests can be summarised as follows wherein all page/line references are to the English language translation of the parent application PCT JP2004/007679/EP 04735123.4.
- (a) Operative claim 1 (all requests) was directed to a composition of an epoxy resin (A) and rubber like polymer particles (B).
 - (b) In the parent application page 3 final paragraph disclosed the process for producing such a composition and page 5 lines 12-15 stated that the application related to the resulting products, thus establishing that the product belonged also to the subject-matter of the parent application.
 - (c) The parent application provided a coherent disclosure of the process, setting out mandatory and preferred steps thereof and also provided a disclosure of the product obtained. Some of the features related only to one or other aspect (i.e. process or product) whilst others related to both. In particular the disclosure of the particles (B) applied both to the process and to the resulting

product.

- (d) The mass content of particles was disclosed at page 13 lines 11-25 in respect of both the process and the product.
- (e) The structure of the polymer core/shell and type of monomers starting at page 4 line 17 although designated "preferable" provided an exact description of component B, which structure of the rubber would be retained in the final composition.
- (f) The particle dispersion ratio defined and quantified the quality of the compositions in terms of the degree of dispersion of rubber particles within the epoxy resin. The skilled person would understand from various parts of the description that the essence of the invention was compositions having a high degree of dispersion. This was shown by page 3, lines 21-22, and page 5, last paragraph which emphasised the need for the rubber particles to be stably dispersed. The method for determining this property and threshold value of 90% as a criteria for a "good" particle dispersion ratio, disclosed in respect of the measurement method at page 22, line 17 to page 23, line 23, would in the light of the technical problem underlying the application be understood as defining and delimiting the products which were the subject-matter of the parent application. In particular the skilled person would recognise that this value of the particle dispersion ratio was central to the invention and that the measurement method and indicated threshold value was generally applicable and not restricted to the examples.

- (g) The final features of the claim relating to treatment of the rubber particles were in "product by process format" and were disclosed at page 3 line 21 to page 4 line 12. The parent application made clear that such treatment steps were employed to provide the desired product in particular in order to avoid coagulation of the particles.
- (h) The application could be seen as a "recipe" setting out those features which had to be taken into account, either mandatorily or preferably. The claim had been drafted to follow as closely as possible the technical information set out in the application. Various aspects had to be taken into consideration e.g. the characteristics of the particles in terms of the monomers, the structure (core/shell) and particle size, whereby these had to be selected to provide a stable dispersion.

VIII. The appellant requested that the decision under appeal be set aside and that one of the sets of claims according to the main request or to auxiliary requests 1 to 7, all filed with letter dated 13 September 2017, be found to meet the requirements of Articles 76(1), 123(2), 54 and 84 EPC, and that the case be remitted to the examining division for further prosecution.

Reasons for the Decision

- 1. Main Request- Article 76(1) EPC
 - 1.1 The parent application was directed to a process for producing a modified epoxy resin involving incorporation of a dispersion of rubber particles into

the epoxy component (page 1 under "Technical Field", page 3 under "Disclosure of the Invention" and claim 1).

The resulting product was also stated to form the subject-matter of the invention (page 5, lines 12-15).

The parent application disclosed various process steps, some of which were mandatory whilst others were preferable.

- 1.2 Operative claim 1 is based on a combination of features which are derived from different parts of the description and are disclosed as being at different levels of preference in the parent application. Although individually all the features of operative claim 1 can be identified in the parent application there is no statement linking these and no other disclosure of all of these in combination.

Thus, taking that part of the claim which is common to all requests, i.e. excluding the final sections relating to the treatment of the dispersion with organic media feature by feature:

- 1.2.1 *"An epoxy resin composition comprising an epoxy resin (A) and rubber-like polymer particles (B), in which the rubber-like polymer particles (B) are dispersed in the epoxy resin (A)"*

A basis is to be found at page 3, lines 21-23 disclosing the process as being directed to producing such a composition and at page 5, lines 12-18 which discloses that the invention also relates to the obtained composition and cured products thereof, followed by a reiteration of the process defined in

terms of the properties of the resulting product.

- 1.2.2 *"and the content of the rubber-like polymer particles (B) is 0.5 to 80% by weight when the total amount of the epoxy resin (A) and rubber-like polymer particles (B) is 100% by weight,"*

Page 13, lines 17-19 states:

"Assuming that the total amount of the epoxy resin (A) and rubber-like polymer particles (B) in the epoxy resin composition is 100% by weight the content of the rubber-like polymer particles (B) is **for example** 0.5 to 80% by weight [...]" (Board's emphasis).

The presence of the terms "Assuming" and "for example" indicates that the characterisation of the amount of rubber-like polymer particles (B) in the epoxy resin composition disclosed in that passage is of a non-mandatory, general explanatory nature. This passage does not provide an unambiguous disclosure that compositions having 0.5 to 90% by weight of rubber-like polymer particles (B) necessarily belong to the subject-matter of the application.

Accordingly this feature as it now stands in present claim 1 is not shown, within the disclosure of the parent application and to the extent that the parent application relates to products, to have a basis. At the very least a selection is needed to arrive at this feature.

- 1.2.3 *"wherein:
the rubber-like polymer particles (B) are obtainable by graft-polymerizing 5 to 50% by weight of a shell layer (B-2) with 50 to 95% by weight of a rubber particle*

*core (B-1), and the average particle diameter of the rubber-like polymer particles (B) is **0.03 to 2 μm**;*

and

the rubber particle core (B-1) comprises elastic materials composed of not less than 50% by weight of at least one monomer selected from the group consisting of diene monomers and (meth)acrylate monomers and less than 50% by weight of another copolymerizable vinyl monomer, or polysiloxane rubber elastic materials, or a mixture thereof; and

the shell layer (B-2) comprises at least one monomer selected from the group consisting of (meth)acrylates, aromatic vinyls, vinyl cyanides, unsaturated acid derivatives, (meth)acrylamide derivatives and maleimide derivatives;" (Board's emphasis)

This wording, with the exception of the particle size, is disclosed at page 4, lines 17 to page 5 line 1. However this section is introduced with the words "It is preferable" indicating that this constitution of the rubber-like polymer particles is not a mandatory feature but has to be selected within a broader disclosure of the rubber-like polymer particles (B) such as that on page 7 lines 9-13.

Besides, the range of 0.03 to 2 μm defining the particle size of the rubber-like polymer particles (B) as now claimed is not disclosed on page 4 where the constitution of the particles is discussed but on page 13 line 9, where it is stated, with no reference to the constitution of the rubber particles, that the diameter of the particles (B) is "not particularly limited", the particles then being specified as "preferably" having a diameter in the claimed range. A further selection - from a separate part of the original disclosure to that

discussing the constitution of the particles - is required to arrive at the specified particle size range.

Accordingly the definition of the particles and their size as recited above is a collocation of two features, which are only preferable, but not mandatory, and are not necessarily linked to each other. Thus each of these features has to be separately selected from within the disclosure of the parent application in order to arrive at the claimed subject-matter.

1.2.4 *"the dispersed state of the rubber-like polymer particles (B) in the epoxy resin (A) is such that when the dispersed state of the rubber-like polymer particles (B) in the epoxy resin (A) is judged by curing the epoxy resin composition and observing the cured product under a transmission electron microscope by an ultra-thin section method as defined herein, the particle dispersion ratio calculated according to the following equation is not less than 90% : particle dispersion ratio (%) = (1 - (B1/B0)) x 100, wherein B1 is the number of the rubber-like polymer particles (B) in the form where three or more polymer particles are contacted with one another, and B0 is the total number of rubber-like polymer particles (B);"*

This parameter and its determination is discussed in the context of the examples at pages 22, line 17 to page 23, line 23.

It is disclosed in the context of this method that a "Good" rating required a particle dispersion ratio of 90% or more (page 23 line 13).

This is the only disclosure of a quantitative measure of

the dispersion ratio in the parent application. There is no general statement that this degree of dispersion is a mandatory or characterising feature of the outcome of the process or of the resulting products.

The appellant argued the skilled person would have realised from this discussion in the context of the examples and in view of the stated aim of the process that the application was to be understood as directed or restricted to (production of) compositions having such a dispersion ratio.

There is however no general disclosure of this requirement as inevitably forming part of the subject-matter of the application, either in terms of the necessary or inherent outcome of the process or more specifically in the context of the particles which are stated to form part of the subject-matter of the parent application. Nor is there any other indication in the parent application from which such a property may be implied as forming a mandatory feature of the subject-matter. Whilst the skilled person might have concluded in view of technical considerations, upon reading the description of the measurement method, the examples and the remainder of the application, and taking account of the general aim of the parent application that this value represented some kind of at least preferred value of the dispersion ratio, such a realisation would not be based solely on the disclosure - direct and unambiguous even if implicit - of the parent application.

Subject-matter that becomes apparent as a result of such considerations as outlined in the foregoing - which are in effect related to obviousness - does however not belong to the content of the document in

question and hence cannot be relied upon in establishing what is disclosed by the application in the sense of Article 76(1) or 123(2) EPC (see T 823/96, reasons 4.5).

Accordingly the feature of the particle dispersion ratio as defined in the operative claim goes beyond the content of the parent application as filed.

- 1.2.5 From the above it emerges that, with the exception of the particle dispersion ratio, each of the features or groups of features of the claim can be identified in the parent application as filed, but that there is no single coherent disclosure of these features in the combination as now defined in operative claim 1. In particular the claim consists of a combination of features which are mandatory and others which are preferable, representing the result of a plurality of selections from different parts of the original disclosure and of different levels of preference. The disclosure of one of the features - the particle size - in the parent application is ambiguous since this is presented only as being "for example", neither mandatory nor preferable but some other - undefined status.

Consequently it is not possible to identify a basis for the features of the first part of the claim in combination in the parent application as filed, leading to the conclusion that the requirements of Article 76(1) EPC are not satisfied.

- 1.2.6 Under these circumstances it is not necessary to address the question of the allowability of the final "product by process" part of the claim relating to the treatment of the rubber particles prior to combining

with the epoxy resin.

2. Auxiliary requests 1-7 - Article 76(1) EPC

Since the corresponding part of claim 1 of all these requests is identical to that of the main request, the above conclusion applies to all auxiliary requests.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



B. ter Heijden

D. Marquis

Decision electronically authenticated