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**Datasheet for the decision
of 27 June 2019**

Case Number: T 0518/16 - 3.3.03

Application Number: 10157844.1

Publication Number: 2368916

IPC: C08C1/12, C08C2/00, C08F6/10,
C08L9/02

Language of the proceedings: EN

Title of invention:

Process for the production of water and solvent-free nitrile rubbers

Patent Proprietor:

ARLANXEO Deutschland GmbH

Opponent:

ZEON CORPORATION

Headword:

Relevant legal provisions:

RPBA Art. 12(1), 12(2), 12(4), 13(1)
EPC Art. 56

Keyword:

Documents submitted with the statement of grounds (admitted in part)

Documents submitted shortly before the oral proceedings (not admitted)

Main request - Inventive step (no) - obvious purification step

Auxiliary request belated - prima facie allowable - admitted into the proceedings



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Case Number: T 0518/16 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 27 June 2019

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
7 January 2016 concerning maintenance of the
European Patent No. 2368916 in amended form.**

Composition of the Board:

Chairman D. Semino
Members: F. Rousseau
C. Brandt

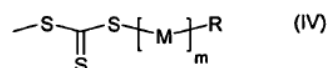
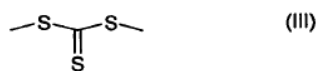
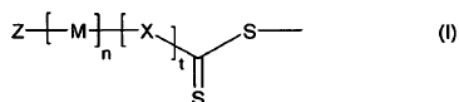
Summary of Facts and Submissions

I. The appeal by the opponent is directed against the interlocutory decision of the opposition division posted on 7 January 2016 according to which European patent No. 2 368 916 as amended according to the version labelled "auxiliary request 1.1" submitted during the oral proceedings on 14 October 2015 (claims 1 to 26 and pages 1 to 46 of the description) met the requirements of the EPC. The decision was also based on the patent as granted as the main request.

II. Claim 25 of the patent as granted read as follows:

"25. A Nitrile Rubber comprising

- (i) repeating units derived from at least one conjugated diene, at least one α,β -unsaturated nitrile and optionally one or more copolymerizable monomers and
- (ii) one or more structural element of the general formulae (I), (II), (III), (IV) oder (V)



wherein

Z represents H, branched or unbranched, saturated or one or more times unsaturated alkyl, saturated or one

or more times unsaturated carbo- oder heterocyclic residue, aryl, heteroaryl, arylalkyl, heteroarylalkyl, alkoxy, aryloxy, heteroaryloxy, amino, amido, hydroxyimino, carbamoyl, akoxycarbonyl, F, Cl, Br, I, hydroxy, phosphonato, phosphinato, alkylthio, arylthio, sulfanyl, thiocarboxy, sulfinyl, sulfono, sulfino, sulfeno, sulfonsäuren, sulfamoyl, silyl, silyloxy, nitril, carbonyl, carboxy, oxycarbonyl, oxysulfonyl, oxo, thioxo, borate, selenate, epoxy, cyanate, thiocyanate, isocyanate, thioisocyanate und isocyanide, **M** represents repeating units derived from one or more monomers which are one or more times unsaturated, including conjugated or unconjugated dienes, alkines and vinyl compounds, or a structural element derived from polymers comprising polyether, particularly polyalkylenglycolether und polyalkylenoxides, polysiloxanes, polyoles, polycarbonates, polyurethanes, polyisocyanates, polysaccharides, polyester and polyamides, n und m are same or different and in the range of from 0 to 10.000, **t** is 0 or 1, if n= 0, and equals 1, if n ≠ 0, **X** represents C(Z₂), N(Z), P(Z), P(=O)(Z), O, S, S(=O) or S(=O)₂ wherein Z has the same meaning as defined hereinabove, **R (a)** in case that m ≠ 0 has the same meaning as the residue Z, **(b)** in case that m = 0, represents H, a branched or unbranched, saturated, one or more times unsaturated alkyl, a saturated, one or more times unsaturated carbo or heterocyclic rest, aryl, heteroaryl, arylalkyl, heteroarylalkyl, alkoxy, aryloxy, heteroaryloxy, amino, amido, carbamoyl, alkoxy, aryloxy, alkylthio, arylthio, sulfanyl, thiocarboxy, sulfinyl, sulfono, sulfino, sulfeno, sulfonsäuren, sulfamoyl, carbonyl, carboxy,

oxycarbonyl, oxysulfonyl, oxo, thioxo, epoxy, cyanate, thiocyanate, isocyanate, thioisocyanate or isocyanide,

wherein the content of volatile compounds in the nitrile rubber is less than 1,25 wt%, preferably less than 0,75 wt%, more preferably less than 0,5 wt%, most preferably less than 0,2 wt% based on the mass of the nitrile rubber, and wherein the glass transition temperature of the nitrile rubber is situated in the range from -70°C to +20°C."

The other claims 1 to 24 and 26 as granted were directed in broad terms to a process of removing volatile compounds from a fluid containing at least one nitrile rubber as defined in claim 25 and at least one volatile compound. Their wording is not relevant for the present decision.

III. In auxiliary request 1.1 solely claim 25 was amended by replacing at the end the claim the wording "wherein the content -70°C to +20°C" by the following wording:

"wherein the content of volatile compounds in the nitrile rubber is less than 1,25 wt%, wherein the residual water concentration is less than 0,5 wt % and wherein the residual concentration of volatile organic compounds is less than 0,75 wt %, based on the mass of the nitrile rubber, and wherein the glass transition temperature of the nitrile rubber is situated in the range from -70°C to +20°C, and wherein the term volatile organic compounds means organic compounds having a boiling 10 point of below 250°C at standard pressure".

IV. The following items of evidence cited before the opposition division have been referred to on appeal:

D1: JP 2005-68385 A and partial translation thereof in English D1a

D2: EP 0 822 204 A2

D6: JP 2002-003523 A and partial translation thereof in English D6a

V. According to the reasons for the contested decision which are relevant for the appeal proceedings the subject-matter of claims 1 to 24 directed to a process of removing volatile compounds from a fluid containing at least one nitrile rubber and at least one volatile compound were found to meet the requirements of sufficiency of disclosure, novelty and inventive step. Moreover, novelty of the nitrile butadiene rubber of claim 25 was acknowledged, since D1 related to a hydrogenated NBR which was not a nitrile rubber in accordance with the definition of granted claim 25, D2 did not disclose the glass transition temperature of the NBR prepared and D6 neither disclosed the glass transition temperature of the NBR mentioned nor its content of volatile compounds. Regarding inventive step of the nitrile butadiene rubber of claim 25, D2 represented the closest prior art. In the absence of any advantageous effect with respect to a glass transition in the range of -70°C to $+20^{\circ}\text{C}$ the problem solved over D2 was the provision of an alternative NBR copolymer having a specific content of volatile compounds. The argument of the patent proprietor that by the method of D2 solvents having a boiling point in the range of 105°C to 250°C would not be removed was not convincing since claim 25 did not specify the nature of the volatile compounds in the nitrile rubber. Therefore the technical problem underlying the patent

in suit was already solved in D2 and claim 25 did not involve an inventive step. Concerning auxiliary request 1.1 the amendments to claim 25 did not contravene the requirements of Articles 84, 123(2) and 123(3) EPC. Considering that the process of D2 would only remove organic volatile substances having a boiling point up to 100°C, the objective problem solved over D2 by the subject-matter of claim 25 was the provision of a nitrile rubber substantially not leaching any toxic-by-products and therefore suitable for uses in contact with potable water, food or pharmaceutical products. Since using nitrile rubbers for such uses was not suggested by the prior art and mere steam stripping as was state of the art would only remove some organic volatile compounds and increase the water content, an inventive step was acknowledged.

VI. An appeal against that decision was lodged by the opponent (appellant). The statement setting out the grounds of appeal submitted with letter of 19 April 2016 included the following document:

D7: US 2005/0197486 A1

D8: JPH10-100145 A and partial translation thereof in English D8a

D9: Werner Hofmann, Rubber Technology Handbook, Hanser Publishers, Munich, 1989, Table of contents and pages 67 to 78.

VII. The patent proprietor (respondent) submitted with their rejoinder (letter of 5 September 2016) the following documents:

D6b: Machine translation of D6

D8b: Machine translation of D8.

VIII. In the Board's communication sent in preparation of the oral proceedings it was noted that the text of "auxiliary request 1.1" attached to the minutes of the oral proceedings was incomplete as the last part of claim 25 presumably comprising the amendments addressed in the minutes and claim 26 indicated to be part of the documents for the maintenance of the patent as amended in EPO Form 2327 were missing. It was also indicated that the amended text attached to the written decision ("Druckexemplar") did not comprise "auxiliary request 1.1" but instead the text of the third auxiliary request which was not examined before the opposition division. The Board was however able on the basis of the minutes and the reasons for the decision to identify the text meant to be that of "auxiliary request 1.1".

IX. Following the Board's communication the respondent submitted with letter of 27 May 2019 the full text of "auxiliary request 1.1", already submitted during the oral proceedings before the opposition division on 14 October 2015. The respondent also submitted an auxiliary request labelled "auxiliary request 4" corresponding to "auxiliary request 1.1" in which product claim 25 had been deleted and claim 26 renumbered as claim 25. The respondent also submitted the following documents:

D10: <https://en.wikipedia.org/wiki/Polysulfone>

D11: <https://www.industrialspec.com/images/files/polysulfone-chemical-compatibility-chart-from-ism.pdf>, page 3

X. Oral proceedings before the Board took place 27 June 2019.

XI. As far as relevant to the present decision, the submissions of the appellant can be summarized as follows:

Admittance of documents D7, D8, D8a, D9, D10 and D11

(a) D7, D8, D8a, D9 were submitted in reaction to the argument presented for the first time during the oral proceedings before the opposition division that granted claim 25 related only to non-hydrogenated nitrile butadiene rubber (NBR) and did not encompass hydrogenated NBR (HNBR). This argument was not convincing because the term "nitrile rubber" was generic, encompassing the special case of hydrogenated NBR. However, since the opposition division nevertheless accepted this new argument, it was necessary to provide documents which did not only relate to hydrogenated NBR, but also to NBR as was the case for D7, D8, D8a and D9. Moreover, the filing of D7 was in response to the finding of the opposition division that it was not suggested to provide nitrile rubbers for use in food products, pharmaceuticals or products in contact with potable water, i.e. nitrile rubbers required to be free of toxic by-products. D8 taught in paragraph [0024] that a downstream water treatment led after a drying step by conventional means to a purified rubber. The submission of D8/D8a was therefore in response to contested decision. These documents should be therefore admitted into the proceedings. As to D10 and D11, these documents should have been submitted earlier by the patent proprietor. D10 was an excerpt of Wikipedia and accordingly the validity of the information contained therein was uncertain. D11 was not relevant as it had a copyright of 2019.

Hence, pursuant to Article 13(1) RPBA D10 and D11 should not be admitted into the proceedings.

Main request (labelled "auxiliary request 1.1") - inventive step

- (b) D7 taught the usefulness of a nitrile rubber with high purity in the field of food, pharmaceutical, cosmetic and electronics. For this purpose it concerned a method for the preparation of purified elastomers prepared by emulsion polymerization, wherein the level of impurity was reduced by up to 99 wt. % expressed in terms of the unpurified elastomer. The purified NBR obtained in Example 1 of D7 constituted the closest prior art. It had an acrylonitrile content of 34 wt. %, meaning in light of D9 (page 69, Figure 3.3) that the Tg of this rubber was within the range of -70°C to +20°. D7 defined the "impurities" of the rubber also to encompass volatile compounds, i.e. also organic compounds having a boiling point of below 250°C. Considering that the the level of impurities contained in the starting material was reduced by up to 99 wt.% based on the weight of the unpurified elastomer and taking into account the impurity level of 1 wt.% of the unpurified elastomer in Example 1 of D7, the purified NBR had an impurity level of 0.01 wt.% including volatile organic compounds having a boiling point of below 250°C at standard pressure other than chlorobenzene used as a solvent for dissolving the NBR. The moisture content of the purified NBR was also not described in D7.

- (c) The patent in suit did not disclose any advantageous effect which could be achieved by

setting the upper limits for contents of water and volatile compounds defined in claim 25. The problem solved over the closest prior art was therefore the mere provision of a rubber suitable for uses in contact with potable water, food or pharmaceutical products.

- (d) The idea of removing the chlorobenzene used as a solvent for dissolving the NBR was obvious having regard to the purity requirements resulting from the uses envisaged in D7. To reduce the amount of water and solvent contained in a dried NBR was well known in the art. This could be achieved using numerous conventional methods such as those listed in paragraph [0030] of D7, for example boiling down or degassing. D6 also showed a method of recovering various rubber, including NBR, which method led to rubbers having low amounts of residual water and residual solvents. When toluene (boiling point of 110.6°C) was present the method of D6 led to a residual content of toluene of 400 ppm. It had therefore to be expected that by applying the method of D6 to the purified rubber of Example 1 of D7 the amount of chlorobenzene contained in the purified rubber which had a slightly higher boiling point (132°C) than that of toluene, would be reduced well below a residual content of less than 7,500 ppm as required by operative claim 25.
- (e) Hence, the skilled person starting from Example 1 of D7 would arrive in an obvious manner to the rubber of operative claim 25. The requirements of Article 56 EPC were therefore not met.

Auxiliary request (labelled "auxiliary request 4") - admittance

- (f) Auxiliary request 4 was late filed and no justification for its late filing was provided. Furthermore, the submissions of the parties only related to claim 25 of auxiliary request 1.1. Accordingly, auxiliary request 4 should not be allowed into the proceedings.

XII. As far as relevant to the present decision, the submissions of the respondent can be summarized as follows:

Admittance of documents D7, D8, D8a, D9, D10 and D11

- (a) A misinterpretation of the term nitrile butadiene rubber (NBR) by the opponent as to encompass also the distinctive hydrogenated nitrile rubber (HNBR) did not constitute a valid justification to submit new documents which could have been already presented during the opposition period. In addition D7 and D8 were not more relevant than D6. Moreover, the use of NBR in the food industry was already known by a person skilled in the art as shown in D9 (page 78, first paragraph) and the need to provide nitrile rubbers for use in food products, pharmaceuticals or products in contact with potable water was addressed in paragraph [0174] of the patent in suit. The opponent had therefore no reason to be surprised by the arguments of the patent proprietor in favour of an inventive step which had been submitted during the oral proceedings before the opposition division. Accordingly, documents D7, D8, D8a and D9 should not be admitted into the proceedings. D10 and D11

represented the general knowledge in the art and should therefore be admitted into the proceedings.

Inventive step

- (b) D7 related to a method for the preparation of purified elastomers prepared by emulsion polymerization. D7, however, did not represent an enabling disclosure because D7 did not provide information on the material of the ultrafiltration membrane to be used in its Example 1. Impurities with different polarities should be separated from the nitrile rubber and the disclosure in paragraph [0026] concerning suitable membrane materials was of no assistance. A number of membrane materials having different polarities were mentioned therein, but apparently not all of them were useful for the ultrafiltration process disclosed in Example 1 in D7, as for example polysulfones were known not to be resistant to chlorobenzene which was the solvent used in Example 1 of D7.

- (c) If the Board was of the opinion that the subject-matter of D7 was enabling, it had to be considered that the term "impurities" was intended to mean all monomers, additives and/or reaction products thereof known to the person skilled in the art, which could be unreacted, added and/or produced during the preparation of an elastomer (paragraph [0020]). That term, however, did not include water or organic solvent. Based on the total amount of fatty acids contained in the NBR of Example 1 of D7 before and after ultrafiltration it was not possible to deduce its water content after ultrafiltration. Moreover, the material of the ultrafiltration membrane was unknown and the

prediction of the chemical and physical behavior of water in contact with an ultrafiltration membrane was not possible. Furthermore, it could not be ascertained whether the membrane material used in Example 1 of D7 was also selective for other impurities having a different chemical and physical behavior than fatty acids. Accordingly, although it was accepted that the NBR used in Example 1 of D7 based on its acrylonitrile content exhibited a Tg within the range of -70°C to $+20^{\circ}\text{C}$, a residual water concentration in the purified rubber of less than 0.5 wt.% constituted a feature distinguishing the NBR of operative claim 25 from the purified NBR disclosed in Example 1 of D7. Moreover, considering that a large amount of solvent used for the ultrafiltration had to be present in the purified elastomer after the ultrafiltration step, a residual concentration of organic compounds having a boiling point of below 250°C at standard pressure being less than 0,75 wt% constituted an additional feature distinguishing the rubber of operative claim 25 from the NBR of Example 1 of D7.

- (d) There was a demand for nitrile rubber having a residual concentration of "volatile organic compounds" which was as low as possible, especially in food and pharmaceutical industries. The problem solved by the subject-matter of claim 25 over the purified NBR of Example 1 of D7 was the provision of a solid nitrile rubber which was suited for uses in contact with potable water, food or pharmaceutical products. This was achieved by the complex process defined in claim 1 of the patent in suit. There was no information in the prior art that the residual concentration of "volatile organic compounds" and at the same time the

residual water concentration, both defined in operative claim 25, could be achieved by methods known in the art, such as those described in paragraph [0030] of D7. The fact that D6 disclosed that two specific styrene butadiene rubber (SBR) and polybutadiene rubber (PBR) could be dried to contain a residual amount of water of 0.3 to 0.4 wt% and a residual amount of solvent of 400-500 ppm did not necessarily prove, that the same low amounts of residual water and solvent could be achieved for any rubber, especially for NBR. A person skilled in the art with the intention to reduce the amount of water and volatile organic compounds in a nitrile rubber polymer, which was obtained in a water-based emulsion polymerization process, would refrain from adding volatile organic compounds in a first step and then, in a second step, water or moisture, as it was against the purpose of the invention. Even if the skilled person had combined the teaching disclosed in D7 and D6, it would have still been unknown whether he would inevitably have arrived at a NBR in accordance with operative claim 25.

- (e) The subject matter of claim 25 of auxiliary request 1.1 involved therefore an inventive step.

Auxiliary request (labelled "auxiliary request 4") - admittance

- (f) Auxiliary request 4 did exclusively comprise granted process claims 1-24 and 26. The patentability of said process claims which had been acknowledged by the opposition division had not been questioned on appeal. There was therefore no reason not to admit that request into the proceedings.

XIII. The appellant requested that the decision under appeal be set aside and that the European patent No. 2368916 be revoked. It was also requested that documents D7, D8, D8a and D9 be admitted into the proceedings. The appellant also requested that auxiliary request 4 and documents 10 and 11 not be admitted into the proceedings.

XIV. The respondent requested that the decision under appeal be set aside and the patent be maintained on the basis of auxiliary request 1.1, or alternatively on the basis of auxiliary request 4, both filed with letter dated 27 May 2019. It was also requested that documents D7, D8, D8a and D9 not be admitted into the proceedings.

Reasons for the Decision

Admittance of documents D7, D8, D8a and D9 into the proceedings

1. The admittance of documents D7, D8, D8a and D9 which were filed by the appellant for the first time with the statement of grounds of appeal is to be assessed in the light of the provisions of Article 12(4) RPBA which requires the Board to take into account everything presented by the parties under Article 12(1) RPBA if and to the extent that it relates to the case under appeal and meets the requirements in Article 12(2) RPBA. However, according to Article 12(4) RPBA, the Board has the discretionary power to hold inadmissible facts, evidence and requests that could have been presented or were not admitted in the first instance proceedings.

1.1 The non-suggestion by the prior art to use nitrile rubbers for preparing products in contact with potable

water, food or pharmaceutical products constituted the pivotal argument in the reasons for the contested decision based on which the opposition division concluded that the amendments introduced into claim 25 of auxiliary request 1.1, aimed among others at specifying the type of "volatile organic compounds" whose maximum content should be minimized, overcame the objection against claim 25 of the main request (points 7.4 and 7.6 of the Reasons for the decision). That argument as well as auxiliary request 1.1, however, were submitted for the first time at the oral proceedings (last paragraph of page 5, and third paragraph of page 6 of the minutes).

- 1.2 D7 shows in paragraph [0041] that the type of nitrile rubbers defined in claim 25 was already suggested for products in contact with food or in the medical field. D7 also highlights the necessity to meet specific purity requirements in relation to these uses, in particular a low level of organic solvent. D9 is an encyclopedia demonstrating the common general knowledge in relation to nitrile rubbers. It also indicates the use of this type of rubbers in products for the food industry (page 78, section 3.3.3.8, penultimate sentence).
- 1.3 Whether the use of nitrile rubbers in products for the food industry, pharmaceuticals or products in contact with potable water, should have been known to the opponent, because it was common general knowledge or whether an argument by the patent proprietor based on that use should have been expected as this use was already indicated in the specification is irrelevant to the admittance of D7 or D9. The decisive point is rather that said pivotal argument and a modification of claim 25 giving weight to that argument were submitted

at a point of time when the opponent was not in the position to submit documents appropriate to counter that argument.

1.4 Therefore the filing of documents D7 and D9 with the statement of grounds of appeal is a direct and legitimate reaction to the new submissions made by the patent proprietor during the oral proceedings before the opposition division. The Board therefore sees no valid reason to make use of its discretionary power under Article 12(4) RPBA and to hold documents D7 and D9 as inadmissible. As a consequence documents D7 and D9 are in the proceedings.

1.5 D8/D8a which is concerned with NBR is proposed by the appellant as an alternative starting point for assessing inventive step. The appellant justifies the filing of this document at the appeal stage in view of the patent proprietor's argument presented for the first time during the oral proceedings that D1 relating to HNBR rubbers did not qualify as the closest prior art for assessing inventive step of the subject-matter of claim 25, since the latter was concerned only with non hydrogenated rubbers, HNBR rubbers being not nitrile rubbers as required by claim 25.

The issue to be considered here is not whether the opponent could have been surprised by the patent proprietor's submission that HNBR rubbers were not encompassed by the subject-matter of claim 25, but rather whether the opponent would have been aware that claim 25 was directed to non hydrogenated rubbers. As shown at least by the opponent's submissions concerning lack of novelty in view of D2 held to disclose NBR rubbers (pages 9-12 of the notice of opposition) the opponent was aware that claim 25 covered NBR rubbers

with the consequence that the filing of a new document dealing with NBR rubbers instead of HNBR rubbers cannot be justified by the patent proprietor's argument submitted at the oral proceedings before the opposition division.

As an additional justification for the submitting document D8/D8a on appeal the appellant argued at the oral proceedings that D8/D8a showed in paragraph [0024] that a downstream water treatment by conventional means led after a drying step to a purified rubber, meaning that the filing of D8/D8a constituted in fact a response to the contested decision. This submission which was made at an extremely late stage of the proceedings represents an amendment to a party's case pursuant to Article 13(1) RPBA. In the absence of any indication of any new submission by the respondent or any new issue raised by the Board in its communication which could have triggered this new submission made by the appellant on the basis of D8/D8a, the Board finds no justification for allowing the new submission of the respondent based on paragraph [0024] of D8/D8a into the proceeding, let alone to allow into the proceedings by a back door the whole document D8/D8a.

Thus, in the absence of a proper justification evidence D8/D8a is held inadmissible by the Board in exercise of its discretionary power under both Article 12(4) RPBA and Article 13(1) RPBA.

Admittance of documents D10 and D11 into the proceedings

2. The filing of documents D10 and D11 submitted after the Board's communication and one month before the oral proceedings, represents an amendment to a party's case pursuant to Article 13(1) RPBA and their admission to

the proceedings is subject to the Board's discretion pursuant to Articles 13(1) and 13(3) RPBA. These documents have been submitted to show that the disclosure of Example 1 of D7 is not enabling. According to the respondent polysulfone resins are first mentioned in the list of suitable membrane materials provided in paragraph [0026] of D7, but polysulfone resins are not resistant to chlorobenzene used as solvent in Example 1 of that prior art document. It is however argued at the same time that D7 is silent about the material of the ultrafiltration membrane used in its Example 1. Hence, considering that no justification was provided for the late submissions of D10 and D11 and that these documents relating to polysulfone resins are not relevant to the question whether Example 1 of D7 would be enabling as the membrane material used for that example is unknown, the Board finds it appropriate in the interest of procedural economy to exercise its discretion by not admitting documents D10 and D11 into the proceedings (Article 13(1) RPBA).

Main request - inventive step

Closest state of the art

3. As it appears from the contested decision the closest prior art and starting point for assessing inventive step was seen by the opposition division to be represented by the disclosure of D2. Having regard to the amendments inserted in claim 25 of the granted patent and the indication in paragraph [0174] of the specification that the rubbers of the granted patent should be used for products in contact with potable water, food or pharmaceutical products, the appellant argues that D7 represents a more suitable starting

point for assessing inventive step of the nitrile rubber of claim 25. D7 aims also at providing elastomers having high purity making them suitable for use in the cosmetic and medical fields and in the food and electronic sectors (D7, paragraph [0041]). An example of a purification treatment with a NBR is given in Example 1 of D7. The choice of the purified NBR disclosed in Example 1 of D7 as a suitable starting point for assessing inventive step was not disputed by the respondent (notwithstanding the objection concerning the admittance of D7 into the proceedings) and the Board does not see any reason to deviate from that view.

Assessment of the distinguishing features

4. As noted by the appellant D7 does not describe (i) the glass transition temperature of the purified NBR, (ii) the residual concentration of "volatile organic compounds" and (iii) the residual water concentration of the purified NBR.

4.1 *Glass transition temperature in the range from -70°C to +20°C*

The purified NBR obtained in Example 1 of D7 is the emulsion polymerization product of acrylonitrile and butadiene with an acrylonitrile content of 34 wt. % (paragraph [0045]). It is undisputed as shown by D9 that the glass transition temperature of a NBR depends on its content of nitrile component and that for a content of acrylonitrile of 34 wt. % a NBR rubber exhibits a glass transition temperature in the range defined in claim 25 (page 69, Figure 3.3). Accordingly the glass transition temperature of the nitrile rubber defined in claim 25 does not represent a distinguishing

feature over the closest prior art which was not disputed by the respondent.

4.2 *Residual concentration of organic compounds having a boiling point of below 250°C at standard pressure of less than 0,75 wt%*

In the purification method of D7 the unpurified NBR, prepared by emulsion polymerisation, is dissolved in an appropriate organic solvent or mixture of solvents and the obtained solution undergoes an ultrafiltration step (claim 1, paragraphs [0022] and [0045]). For this purpose "*the elastomer contained in the solution, as well as the impurities, are passed one or more times under pressure over a semipermeable membrane, which lets through the solvent or the solvent mixture, as well as the homogeneously dissolved impurities contained in it (permeate), but holds back the dissolved elastomer (retentate)*" (paragraph [0023]). In this manner the impurities contained in the elastomer obtained by emulsion polymerisation are washed away, the level of impurities being described in claim 1 to be reduced by up to 99 wt.%. That reduction, however, relates only to the impurities present in the elastomer to be treated with the method of D7 and is therefore of no indication of the amount of organic solvent which was used for the ultrafiltration and remained in the elastomer compound (retentate) after having applied the method described in D7. The content in the retentate obtained in Example 1 of D7 of the sole organic solvent used in Example 1 of D7, i.e. chlorobenzene which undisputedly has a boiling point of below 250°C at standard pressure, is therefore not disclosed.

4.3 *Residual water concentration of less than 0,5 wt%*

Concerning the residual water concentration in the purified NBR of Example 1, the NBR contains before treatment 1 wt.% of impurities, 0,11 wt.% being fatty acids (see paragraphs [0045] and [0057], Sample 1 corresponding to the start sample). Accordingly, water, if present at all in the start sample, would account at most for 0,89 wt.% of the impurities based on the amount of elastomer. There is no reason to consider that the impurities to be removed in D7 would exclude water which might be expected to be present as the result for example of an emulsion polymerisation process used for preparing said NBR. This is implicit in view of lines 21-24 of paragraph [0003] of D7 according to which the presence of water should be reduced as being damaging in electronic applications and even explicit from paragraph [0034], line 5 of that document in which water is listed as one of the impurities which are removed by the method taught therein. Furthermore, considering that the temperature at which the method of Example 1 is operated is above the boiling point of water and the fact that the elastomer is passed six times over a membrane (see paragraph [0057]) there is no reason to expect that the purified elastomer obtained in Example 1 of D7 contains more residual water than required in operative claim 25. Moreover, in light of paragraph [0019] the level of impurity is in any event reduced by 50 wt.%. Accordingly, a residual water concentration of less than 0,5 wt% does not represent a distinguishing feature over the purified elastomer obtained in Example 1 of D7.

4.4 Although the respondent was of the opinion that the purified NBR disclosed in Example 1 of D7 was a

suitable starting point for assessing inventive step, it also brought the seemingly contradictory additional argument that D7 did not represent an enabling disclosure, since information on the material of the ultrafiltration membrane used in its Example 1 was not provided. As indicated above, D7 teaches that water is an impurity which can be removed using the method of D7. The Board has no reason to consider that the skilled person would not know which membrane can be used for this purpose. Paragraph [0026] of D7 provides a list of membranes which can be used for the purification method of D7. The Board is persuaded that the skilled person based on the common general knowledge would choose a membrane material which is compatible with the organic solvent employed for the ultrafiltration method. As shown by the submissions of the respondent the compatibility of the membrane materials listed in paragraph [0026] of D7 with various solvents is known to the skilled person, meaning for example that the skilled person for the method of Example 1 of D7 using chlorobenzene would not use a membrane made of a polysulfone material. The respondent, however, did not submit that the skilled person would not be able to select one of the membrane materials listed in paragraph [0026] which would allow to remove water and at the same time would be compatible with chlorobenzene. A credible objection that D7 did not represent an enabling disclosure as it did not define the membrane material to be used in Example 1 would presuppose the existence of serious doubts substantiated by verifiable facts. Accordingly, in the absence of substantiating facts and corroborating evidence in support of the argument that the method disclosed in Example 1 of D7 is not enabled by the teaching of that prior art, this argument based on mere speculations cannot convince the Board.

- 4.5 Accordingly, the closest prior art is represented by the purified NBR disclosed in Example 1 of D7, from which the nitrile rubber of operative claim 25 differs by a definition that the concentration of organic compounds having a boiling point of below 250°C at standard pressure is less than 0,75% wt%, based on the mass of the nitrile rubber. It follows also that a content of volatile compounds in the nitrile rubber of less than 1,25 wt% based on the mass of the nitrile rubber can be also considered as a distinguishing feature over Example 1 of D7, since the content of chlorobenzene in the retentate obtained in Example 1 of D7 is unknown.

Problem successfully solved

5. The selection of a maximum level of volatile compounds in the nitrile rubber of less than 1,25 wt% and of a maximum level of organic compounds having a boiling point of below 250°C at standard pressure of less than 0,75 wt%, both based on the mass of the nitrile rubber, i.e. the sole distinguishing features over the closest prior art, have not been shown, nor argued, to be associated with any advantage or effect, so that the problem solved by the subject-matter of claim 25 over the purified NBR of Example 1 of D7 reside in the provision of a solid nitrile rubber which is suited for uses in contact with potable water, food or pharmaceutical products.

Obviousness of the solution

6. It remains to be decided whether or not the skilled person wishing to solve the problem defined in above point 5 defined would have found obvious in light of the state of the art to use a rubber having the maximum

levels of volatile compounds and organic compounds as identified in above points 4.5.

6.1 D7 teaches that the elastomers obtained with the purification process of D7 are already suitable for use in the cosmetic, medical and food fields (paragraphs [0002] and [0041]). This implies that the level of organic solvent present in the elastomer of Example 1 as a consequence of the ultrafiltration step should if necessary be reduced by applying a drying step as described in paragraph [0030] of that document in order to bring the amount of organic solvent remaining in elastomer to a level which is compatible with the uses addressed in D7. The choice of the maximum level of volatile organic compound defined in claim 25 of less than 0,75 wt.-% is for solvents having adverse effects on health such as chlorobenzene used in Example 1 of D7 in fact already implied by the uses mentioned above which would require contents of such solvent obviously far below 0,75 wt.-%.

6.2 The Board has no reason to expect that the skilled person applying to the NBR purified rubber obtained in Example 1 of D7 the teaching of that document, namely to use the drying methods known in the art such as those described in paragraph [0030] of D7 or in view of the common general knowledge in the art concerning the evaporation of solvents, namely applying sufficient heat under vacuum conditions, would not be able to reduce the level of chlorobenzene remaining in the elastomer below the threshold defined in claim 25. In that context, D6 describes a method for drying rubber, among others NBR (paragraph [0030]), in which as shown in Examples 1 and 2 a flash drier is used to substantially reduce the amount of residual solvent in said rubber (paragraph [0037]; Table 1; last column

"amount of residual solvent (ppm) of the polymer recovered"). In case of toluene (Example 2, paragraph [0035]), a residual content of 500 ppm, i.e. 0,05 wt-%, is achieved. There is no reason to expect that a similar technique applied to the solvent used in Example 1 of D7, i.e. chlorobenzene whose boiling point is only 22°C above that of toluene, would not allow the successful elimination of chlorobenzene. Consequently, the argument that it was still unknown whether the skilled person starting from Example 1 of D7 and applying conventional techniques in the art in order to reduce the content of chlorobenzene would inevitably have arrived at a NBR in accordance with operative claim 25, i.e with a maximum level of less than 0,75 wt.% based on the mass of nitrile rubber, is in view of the above mentioned compelling evidence and the absence of any counter evidence submitted by the respondent not convincing.

- 6.3 It is therefore concluded that the skilled person starting from Example 1 of D7 and wishing to solve the problem defined in above point 5 would have found obvious to keep the level of chlorobenzene at a maximum value of less than 0,75 wt.%, and therefore to keep the level of organic compounds having a boiling point of below 250°C at standard pressure at the same level since additional organic compounds are not used in Example 1 of D7, arriving thereby in an obvious manner at the subject-matter of claim 25.
7. It is therefore concluded that the subject-matter of claim 25 of auxiliary request 1.1 does not involve an inventive step with the consequence that the request of the respondent cannot be allowed.

Auxiliary request (labelled "auxiliary request 4") - admittance

8. "Auxiliary request 4", which differs from "auxiliary request 1.1" only in that claim 25 was deleted and claim 26 renumbered as claim 25, was submitted one month before the oral proceedings with letter of 27 May 2019. Its admittance to the proceedings underlies the stipulations of Articles 13(1) and 13(3) RPBA.
- 8.1 Article 13(1) RPBA specifies that a board in exercising its discretion to admit and consider amendments to a party's case should take into account the complexity of the new subject matter submitted, the current state of the proceedings and the need for procedural economy. One factor to be considered in the exercise of its discretion is therefore whether the newly filed request can be considered *prima facie* allowable at least in the sense that all previous objections have been overcome. This is the case for "auxiliary request 4" which consists of claims 1 to 25, corresponding to claims 1 to 24 and claim 26 as granted (claim 26 being renumbered in auxiliary request 4 as claim 25), identical to claims 1 to 24 and claim 26 of auxiliary request 1.1 pending during the whole appeal proceeding and whose patentability was not disputed by the respondent at any stage of the appeal proceedings, including during the oral proceedings.
- 8.2 Accordingly and despite the absence of justification for filing auxiliary request 4 one month before the oral proceedings, the Board finds it appropriate to exercise its discretion under Article 13(1) RPBA by admitting this request into the proceedings.

8.3 As indicated above, the patentability of the subject-matter defined by claims 1 to 25 of auxiliary request 4 was not disputed and the Board has no reason to take a different view. Auxiliary request 4 is therefore allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent in amended form on the basis of claims 1 to 25 according to auxiliary request 4 filed with letter dated 27 May 2019 and after any necessary consequential amendment of the description.

The Registrar:

The Chairman:



B. ter Heijden

D. Semino

Decision electronically authenticated