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Datasheet for the decision of 26 May 2021

Case Number: T 1395/19 - 3.3.09

Application Number: 13702184.6

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Language of the proceedings: EN

Title of invention:
ACIDIC AQUEOUS PRODUCT COMPRISING OIL-CONTAINING MICROCAPSULES AND METHOD FOR THE MANUFACTURE THEREOF

Patent Proprietor:
Pepsico, Inc.

Opponent:
Arla Foods amba

Headword:
Oil-containing microcapsules/PEPSICO

Relevant legal provisions:
EPC Art. 84, 56
RPBA 2020 Art. 13(2)

Keyword:

Claims - clarity - main request (no) - clarity - auxiliary requests 1 to 5 (no)
Inventive step - auxiliary requests 6 and 7 (no)
Amendment after summons - taken into account (no)

Decisions cited:

G 0003/14, T 0472/88, T 0522/91, T 0759/91, T 1095/09, T 1730/09, T 2027/13

Catchword:

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Beschwerdekammern

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Case Number: T 1395/19 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 26 May 2021

Appellant: (Patent Proprietor)	Pepsico, Inc. 700 Anderson Hill Road Purchase, NY 10577 (US)
Representative:	Maiwald Patent- und Rechtsanwaltsgesellschaft mbH Elisenhof Elisenstraße 3 80335 München (DE)
Respondent: (Opponent)	Arla Foods amba Sønderhøj 14 8260 Viby J (DK)
Representative:	Guardian IP Consulting I/S Diplomvej, Building 381 2800 Kgs. Lyngby (DK)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 13 March 2019 concerning maintenance of the European Patent No. 2811846 in amended form.**

Composition of the Board:

Chairman	A. Haderlein
Members:	C. Meiners
	E. Mille

Summary of Facts and Submissions

I. The appeal was filed by the patent proprietor (appellant) against the interlocutory decision of the opposition division to hold the fourth auxiliary request filed during the oral proceedings allowable.

II. With its notice of opposition, the opponent had requested that the patent be revoked in its entirety on the grounds for opposition under Article 100(a) EPC in combination with Articles 54 EPC and 56 EPC (lack of novelty and lack of inventive step), Article 100(b) and Article 100(c) EPC.

III. The following documents which are relevant to the present decision were cited by the parties in the opposition and appeal proceedings:

D1 WO 2009/070010 (published 4 June 2009)

D5 US 2009/0061048 Al (published 5 March 2009)

D7 D. Guzey et al, Formation, stability and properties of multilayer emulsions for application in the food industry, Advances in Colloid and Interface Science 128-130 (2006), 227-248

D9 US 2009/0004333 A1 (published 1 January 2009)

D25 Expert Declaration by Dr. William Mutilangi, filed by the appellant with the grounds of appeal

IV. In the decision under appeal, the opposition division concluded that the subject-matter of the European patent as granted extended beyond the content of the application as filed (Article 100(c) EPC). The subject-matter of auxiliary requests 1 and 2 as filed during

the oral proceedings was found not novel (Article 54 EPC). The subject-matter of auxiliary request 3 submitted during the oral proceedings was considered to lack inventive step. Auxiliary request 4 filed during the oral proceedings was found allowable by the opposition division.

V. By letter dated 25 May 2020, the appellant re-filed the main request as filed with the grounds of appeal and also filed auxiliary requests 1 to 8, to replace auxiliary requests 1 to 7 as filed with those grounds.

VI. Oral proceedings before the board took place on 26 May 2021. In the course of the oral proceedings, the appellant filed a new, additional, auxiliary request 7a, which ranks after auxiliary request 7 and before auxiliary request 8.

VII. Wording of the relevant claims

Claim 1 of the main request reads:

"An aqueous dispersion of microcapsules wherein the microcapsules comprise:
at least one hydrophobic substance; and
a. an interface layer around the at least one hydrophobic substance wherein the interface layer comprises:
i. protein aggregates obtained by heat treating an aqueous protein solution; and
ii. a negatively charged polymer having blockwise charge distribution,
wherein the protein aggregates consist essentially of denatured globular protein that is at least 50 wt.% denatured."

Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that it comprises the additional feature "wherein the interface layer, water excluded, contains at least 25 wt.-% protein aggregates".

Claim 1 of auxiliary request 2 differs from claim 1 of auxiliary request 1 in that the interface layer, water excluded, contains at least 50 wt.% protein aggregates.

The subject-matter of claim 1 of auxiliary request 3 is further limited over claim 1 of auxiliary request 2 by the feature "with the proviso that said protein aggregates are not cross-linked".

Claim 1 of auxiliary request 4 corresponds to claim 1 of the main request, with the additional limitation "wherein the interface layer comprises protein aggregates and negatively charged polymer in a weight ratio with the range of 10:1 to 1:4".

Compared with claim 1 of the main request, claim 1 of auxiliary request 5 contains the additional restriction "wherein the interface layer, water excluded, mainly consists of protein aggregates and pectin".

Claim 1 of auxiliary request 6 reads:

"A food product, having a pH of 1.0 to 5.5, comprising an aqueous dispersion of microcapsules, wherein the microcapsules comprise:
at least one hydrophobic substance; and
a. an interface layer around the at least one hydrophobic substance wherein the interface layer comprises:
i. protein aggregates obtained by heat treating an aqueous protein solution; and

ii. a negatively charged polymer having blockwise charge distribution,
wherein the protein aggregates comprise denatured globular protein that is at least 50 wt.% denatured."

The subject-matter of claim 1 of auxiliary request 7 is further restricted over claim 1 of auxiliary request 6 by the limitation "wherein the food product is a carbonated soda beverage".

Claim 1 of auxiliary request 7a filed during the oral proceedings before the board corresponds to claim 1 of auxiliary request 7, but contains the additional limitation "wherein the protein aggregates comprise denatured whey protein, and wherein the negatively charged polymer comprises pectin".

The claims of auxiliary request 8 correspond to those of auxiliary request 4 which was held allowable by the opposition division.

VIII. The appellant's arguments, where relevant to the decision, may be summarised as follows:

As to the expression "wherein the protein aggregates *consist essentially of* denatured globular protein that is at least 50 wt.% denatured", which forms part of claim 1 of the main request and auxiliary requests 1 to 5, the appellant took the view that the term "consist essentially of" did not render the subject-matter of these claims unclear. The term "consisting essentially of" had been held to be sufficiently clear in several decisions of the Boards of Appeal, as e.g. in decision T 1730/09, point 1.2.3 of the reasons for the decision. In contrast, decision T 2027/13 cited by the board in its communication pursuant to Article 15(1) RPBA was a

singular case and an isolated decision. Moreover, the "higher-ranking" composition was not open to an objection under Article 84 EPC. The amended feature "consist essentially of" was not unclear, and the definition of the term "consisting essentially of" provided in the description rather supported the appellant's case. It was known which components had a detrimental effect on stability of the dispersions of the microcapsules. The relevant property was their stability in an acidic medium in a low-pH environment. Larger amounts of components known to have a detrimental effect were excluded. This created some labour, but by following the examples of the patent and repeating their teaching it could be established whether there was a difference in terms of stability.

As to the question of inventive step, the teaching of D5 was not compatible with the cross-linking of D1, which was explicitly disfavored in D5. Consequently, a skilled person would not have combined the technical teaching of document D5 with that of document D1.

The improved long-term storage stability (7 days at 32°C) at pH 3 of the dispersions of the patent, comprising the microcapsules containing protein aggregates in the shell, relative to corresponding dispersions comprising microcapsules without the generation of protein aggregates, was thus not obvious to a skilled person in view of D5 as closest prior art.

The improved long-term storage stability at pH 3 in acidic beverages in terms of creaming, sedimentation, flocculation and/or development of off-taste as demonstrated in examples 1 to 3 of the patent in suit had been plausibly shown by the patent, as had also

been ascertained by the opposition division in its decision on page 10, third paragraph.

Consequently, the objective technical problem in view of D5 was to provide an improved aqueous dispersion of microcapsules comprising a hydrophobic substance.

D1 focused on storage stability of microcapsules in open containers and was not concerned with the storage stability of such microcapsules in beverages at pH 3. Further, D1 taught that a subsequent cross-linking step was performed after the heat treatment. Thus the aggregates were not obtained by heating a protein solution without any subsequent modification.

In D5, the complex coacervate delivery systems (microcapsules comprising a lipophilic nutrient in an aqueous dispersion) were already considered stable in terms of shelf storage. There was thus no incentive to further improve the storage stability of the complex coacervates disclosed therein.

The focus of D5 was to provide microcapsule compositions capable of releasing lipophilic nutrients in the lower gastrointestinal tract rather than in the stomach. Hence gelling, cross-linking and hardening, which in D5 were believed to hinder pH-controlled dissociation of the complex coacervates, would have been disregarded by a skilled person in view of this aim. Further, D5 taught that protein matrices that had a high degree of disulfide cross-linking exhibited very poor water solubility. However, such poor water solubility was disadvantageous for the controlled release of the hydrophobic substance into the gastrointestinal tract. Consequently, the teachings of D5 and D1 were not mutually compatible, and D5 taught

away from incorporating protein aggregates into the interface layer of the microcapsules of the aqueous dispersion.

Auxiliary request 7a was filed in particular in case the board took a belated argument of the respondent into account in its decision.

IX. The opponent's (respondent's) arguments, where relevant to the decision, may be summarised as follows:

The amendment "wherein the protein aggregates *consist essentially of* denatured globular protein that is at least 50 wt.% denatured" made claim 1 of the main request and its dependent claims unclear. On page 8, paragraph [0020], last sentence of the application as filed, it was stated that: "The phrase "consisting essentially of" is used to signal that the product or process defined necessarily includes the listed ingredients and is open to unlisted ingredients that do not materially affect the basic and novel properties of the invention." It was unclear what this meant, and two different prior-art documents would give rise to two different interpretations of said expression, which was thus evidently unclear.

The same line of argument applied *mutatis mutandis* to the subject-matter of claim 1 of auxiliary requests 1 to 5.

Moreover, the subject-matter of claim 1 was not limited to the examples, and the compositions of claim 1 of the main request could also comprise unknown components. It was thus an undue burden to check the basic and novel properties of a microcapsule dispersion in accordance with the patent.

There was clear case law for two distinct situations, namely for scenarios where the expression "consisting essentially of" characterised either the whole composition or only a single component of the composition.

With regard to inventive step, the scope of claim 1 was too broad relative to the actual findings of the patent. Inter alia, the pH of all the examples provided in the patent (examples 1 to 3) had a pH adjusted to 3 prior to the addition of the (negatively charged) polymer. Only high ester (HM) or low ester (LM) grade pectin had been employed as said polymer, and only whey protein or ovalbumin had been used in the examples. Moreover, the emulsion had only been added to a beverage having a pH of 3.0, and no other food products had been prepared. Also the technical problem had not credibly been solved for auxiliary requests 6 and 7, as the coacervate complexes claimed were unable to exist ("fall off") at the lower end of the pH range of 1.0 to 5.5.

Also the aggregates formed in D1 inevitably essentially consisted of denatured globular protein.

D1 also taught that the disulfide cross-linked protein-based matrix continued to protect the oil component from oxidation even if applied in products containing water. Likewise, the microcapsules could, according to D1, be used in the form of oil-in-water emulsions and in beverages.

Consequently, the teaching of D1 was not limited to dry powders but was also applicable to e.g. beverages and oil-in-water emulsions. Hence the teachings of D1 and

D5 were perfectly compatible.

Auxiliary request 7a should not be admitted into the proceedings.

X. Requests

The appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of the main request or alternatively on the basis of one of auxiliary requests 1 to 8, all filed on 25 May 2020, or auxiliary request 7a, filed during the oral proceedings.

The respondent requested that the patent be maintained in an amended form which did not extend beyond the request which the opposition division held allowable.

Reasons for the Decision

Main Request

1. Clarity (Art. 84 EPC)

1.1 In claim 1 of the main request, the wording "wherein the protein aggregates *comprise* denatured globular protein that is at least 50 wt.% denatured" has been replaced by "wherein the protein aggregates *consist essentially of* denatured globular protein that is at least 50 wt.% denatured". This amendment ("consist essentially of") was not present in claim 1 as granted, and is thus open to an objection under Article 84 EPC in view of G 3/14.

1.2 The board does not concur with the line of argument of the appellant that in view of the principles

established in G 3/14 only the isolated amendment, here the expression "consist essentially of", could be examined as to whether it met the requirements of Article 84 EPC, and that the "higher-ranking" composition was not under scrutiny as to the consequences of the amendment with regard to the requirement of clarity of the claims.

1.3 In the present case, the chosen definition of a sub-component of the aqueous dispersion of claim 1, i.e. a constituent of the interface layer (protein aggregates "i."), could have a bearing on the clarity of the claimed subject-matter, i.e. the aqueous dispersion as "higher-ranking" feature/element of the claim, if the clarity issue was caused by the amendment made (see the order of G 3/14).

1.4 The board takes the view that the presence of further ingredients (such as protein aggregates not characterised by the limitations imposed by feature "i." of claim 1 or any other component) is not excluded in claim 1: the interface layer *comprises* protein aggregates obtained by heat treating an aqueous protein solution, wherein the protein aggregates consist essentially of denatured globular protein that is at least 50 wt.% denatured.

1.5 Decision T 1730/09 and the case law cited by the appellant at the oral proceedings (referring additionally to T 759/91, T 522/91, T 1095/09 and T 472/88) in the opinion of the board do not apply to the present case. Those decisions relate to cases wherein a composition or compound had been characterised by the term "consisting essentially of" (thus limiting its essential components) and not a *component* of a composition attributed by further

unclear indications in the description, as in the present case, according to which this expression "is used to signal that the product or process defined necessarily includes the listed ingredients and is open to unlisted ingredients that do not materially affect the *basic and novel* properties of the invention".

1.6 In contrast, decision T 2027/13 deals with a case in which a claimed composition is defined by an open formulation, which implies the possible presence of even further active agents (in said case release-controlling agents). It was concluded in said decision that, as the usual reading of the expression "consisting essentially of" made no sense since the presence of additional ingredients was already encompassed by the open formulation of the claim, the skilled person was at a loss as to the possible limitation introduced by said expression relating to a single ingredient of the composition (see points 1.4 to 1.6 of the reasons).

The board holds that this line of argument also applies to claim 1 of the present case, in which an ingredient of the claimed entity (here an aqueous dispersion of microcapsules wherein the microcapsules comprise an interface layer comprising protein aggregates "i.") is also further characterised by the limitation "consist essentially of". The latter limitation applies to the protein aggregates "i.".

1.7 As pointed out by the respondent, the ambiguity as to the exact scope of claim 1 created by changing "comprise" into "consist essentially of" in the context of claim 1 and its feature combination is aggravated by the statement in the last sentence of paragraph [0018] of the patent that this latter expression "is used to

signal that the product or process defined necessarily includes the listed ingredients and is open to unlisted ingredients that do not materially affect the *basic and novel properties* of the invention". The skilled reader for this reason too is thus at a loss as to what protein aggregates are actually covered by claim 1. Such "unlisted" ingredients which could be contained in said protein aggregates are not specified any further in the description in this passage either. Also, the expression "the basic and novel properties" leaves it up to the reader to establish whether "basic and novel" properties are "materially affected" by the presence of a further component in the protein aggregates "i." of claim 1 and how this should be verified for a given composition.

Hence the board does not concur with the appellant's conclusion that, in order to assess whether the condition "consisting essentially of" applied, it had (only) to be established, following the examples of the patent, whether an additional component in the aggregates as specified by feature "i." of claim 1 had a negative effect on the stability of the microspheres in acidic medium in low-pH environment. Likewise, the appellant's argument that a skilled person knew which component had a detrimental effect on the stability of the microcapsule dispersion was not corroborated by the appellant, as correctly pointed out by the respondent.

Further, as put forward by the respondent, the scope of claim 1 is not limited to the examples, but may comprise microsphere dispersions which differ markedly from those of the examples.

It is thus not clear how it should be objectively established whether a given aqueous dispersion of

microcapsules is one falling within the ambit of claim 1 or not.

1.8 Consequently, the board concludes that the subject-matter of claim 1 of the main request lacks clarity and thus does not meet the requirements of Article 84 EPC for this reason.

Auxiliary requests 1 to 5

2. Clarity (Article 84 EPC)

2.1 The additional limitations introduced into claim 1 of auxiliary requests 1 to 4 are not related to the amendment objected to, "consist essentially of", introduced into claim 1 of the main request, see the wording of these claims as reproduced under point VII. above. Consequently, the board concludes that the findings in respect of a lack of clarity of the subject-matter of claim 1 of the main request apply *mutatis mutandis* to the subject-matter of claim 1 of auxiliary requests 1 to 4.

2.2 As to the subject-matter of claim 1 of auxiliary request 5, the board notes that the additional limitation "wherein the interface layer, water excluded, mainly consists of protein aggregates and pectin" does not impose further limitations on protein aggregates "i." to which the feature objected to, "consist essentially of", refers. Hence the reasoning provided under items 1.1 to 1.3, 1.5 and 1.7 equally applies to claim 1 of auxiliary request 5, which therefore does not meet the requirements of Article 84 EPC either.

2.3 Hence the subject-matter of auxiliary requests 1 to 5 does not meet the requirements of Article 84 EPC.

Auxiliary requests 6 and 7

3. Inventive step (Article 56 EPC)

3.1 Claim 1 of auxiliary request 7 encompasses all the features of claim 1 of auxiliary request 6. Since the board considers the subject-matter of auxiliary request 7 to lack inventive step, it is expedient to assess this requirement for the latter subject-matter first.

3.2 In the decision under appeal, the opposition division (like the opponent) regarded D5 as the closest prior art for the subject-matter of claim 1 of the then auxiliary request 3 (present auxiliary request 7). Both parties agree that D5 can be used as a suitable starting point for assessing inventive step. The complex coacervate delivery system of D5 comprising the coacervate particles is stable within a pH range of from 1.5 to 5.0. A shell is formed around the core comprising the hydrophobic nutrient by the cationic and anionic polymers. The anionic polymer may be pectin or modified starch, both being negatively charged polymers within the meaning of the patent in suit (see paragraph [0037] of the patent in suit). The cationic polymers of D5 may be whey proteins (see paragraph [0017] and examples 2 and 6 of D5). Examples 2 and 6 disclose complex coacervate delivery systems also comprising modified starch. D5 generally envisages the use of the coacervate dispersions of encapsulated lipophilic nutrient in acidic beverages. Suitable beverages include carbonated and non-carbonated soft drinks, see paragraph [0026] of D5. The board concurs with the respondent that the dispersions of D5 comprising the

complex coacervate particles can be considered a "food product" and that therefore food products are also exemplified in the examples of D5.

3.3 The difference between the subject-matter of claim 1 of auxiliary request 7 and the disclosure of D5, and in particular the examples thereof, resides in the interface layer as specified in claim 1, comprising protein aggregates obtained by heat treating an aqueous protein solution, wherein the protein aggregates comprise a certain amount of denatured globular protein that is at least 50 wt.% denatured. No delimitation of the subject-matter of claim 1 over the prior art results from the rather vague feature "wherein the protein aggregates comprise denatured globular protein that is at least 50 wt.% denatured". Firstly, denaturation inherently takes place in the activation step of the globular proteins by heating as described in D1, and secondly no test method as to how the degree of denaturation should be quantitated is contained in claim 1. The board also agrees with the first-instance decision on this point (see section "Distinguishing feature" on page 10 and reference to section 4 of the decision therein).

Moreover, with respect to the examples of D5 a further difference resides in the food product being a carbonated soda beverage.

3.4 The patent does not comprise comparative examples which compare microcapsule dispersions of D5 with those in accordance with the patent in suit (in this case those of claim 1 of auxiliary request 7). However, the board holds it plausible that, in view of the comparative examples provided in the patent (in which, as in D5, apparently complexes are formed between the polyanionic

polymer and a protein), microcapsule dispersions having greater stability have indeed been provided in the patent: the comparison between the examples and comparative examples of the patent demonstrates that acidic beverages having a pH of 3 and which contain microcapsule dispersions comprising solutions of heat-treated protein exhibit greater stability in terms of creaming, flocculation, sedimentation and development of taste related to fish oil oxidation than the beverages containing dispersions comprising the mere homogenised blends of solutions of polyanions and globular protein.

The respondent argued in the oral proceedings before the board that D5 taught that the food products could be carbonated soda beverages. No additional technical effect had been substantiated for the latter over non-carbonated beverages in the problem-and-solution approach. The board concurs with the respondent's assessment. In particular, while the examples of D5 do not relate to carbonated soda beverages, no additional technical effect can be acknowledged with respect to this feature distinguishing the claimed food product over the examples of D5.

3.5 Therefore, the board concludes that the objective technical problem in view of D5 has to be formulated as to provide improved acidic food products comprising hydrophobic substances in encapsulated form.

3.6 The respondent argued that it was not plausible that the dispersions of the microcapsules were stable at the lower pH range encompassed by the range of from 1.0 to 5.5 and cited document D7 in this regard. The board notes that D7 is concerned with oil-in-water emulsions stabilised for example by whey protein, and not

microcapsules comprising an interlayer containing protein aggregates as recited in claim 1. Nor does the board see that the respondent's argument that the claimed scope was rather broad when compared to what had actually been shown in the patent could raise verifiable doubts that improved microparticle stability could be obtained across the full breadth of claim 1.

The board thus takes the view that the objective technical problem underlying the subject-matter of claim 1 has been solved across the full breadth of claim 1, and thus the problem does not need to be reformulated.

3.7 As to obviousness, the board observes as follows:

3.7.1 The appellant took the view that a skilled person in view of D5 would not turn to document D1 to modify the complex coacervate delivery system: D5 already featured the coacervate capsules of D5 as stable in acidic solution and therefore a skilled person had no motivation to depart from the teaching of D5. However, the board holds that the objective technical problem is based on the premise that the microcapsules of claim 1 are plausibly more stable than the coacervate capsules of D5. Thus it cannot reasonably be argued that a skilled person would not look for an improvement of the acid stability of the coacervates of D5.

3.7.2 Further, the appellant argued that if the acid stability of the coacervate capsules of D5 had to be improved, a skilled person would rather turn to D9 and not D1, as D9 taught a two-shell structure for increasing the oxidative stability of hydrophobic encapsulated unsaturated fatty acids (see paragraphs [0004], [0031] and [0039] of D9). In contrast, D5

taught away from cross-linking the cationic protein (as accomplished in D1), since this would impede the release of the encapsulated core material in the lower gastrointestinal tract.

The board accepts that D9 could be an alternative avenue towards improved stabilisation of the coacervate capsules of D5. However, the salient point is not whether, starting from D5, there would have been an alternative avenue towards more stable emulsions of encapsulated hydrophobic substances, but whether the subject-matter of claim 1 is obvious to a skilled person in view of D5 as closest prior art. The mere presence of a second avenue towards improved microcapsule stability in acidic environment in the opinion of the board does not confer inventive merit.

3.7.3 Document D1, however, provides a route which could be taken in order to arrive at food products (here carbonated soft drinks) comprising aqueous dispersions of microcapsules comprising a hydrophobic substance, wherein the stability of the microcapsules in acidic aqueous environment is improved.

3.7.4 D1 teaches that, by providing a cross-linked protein-based encapsulation matrix that contains at least 10 wt.% of a protein that has been cross-linked by means of disulfide cross-links, encapsulates continue to protect an oil component effectively against oxidation when applied in products containing water (see page 3, lines 19 to 22 and claim 1 of D1).

3.7.5 As outlined in the impugned decision, D1 discloses that the activated protein aggregates can be prepared by heating. The activation step of D1 is protein denaturation of the *dissolved* protein molecules being

dissolved in an aqueous phase. Hence the aggregates are obtained by heating a protein solution. In a suspension comprising a dispersed oil phase and activated protein aggregates, the aggregates spontaneously form a layer around the oil droplets. Thus it is possible to encapsulate the oil droplets *in situ* by cross-linking the protein aggregates in the interface layer (see page 4, lines 12 - 14 and 22 - 23 and page 5, lines 4 - 8 of D1).

This is in line with the patent in suit, wherein cross-linking of the protein aggregates by forming disulfide bridges between the protein molecules is also envisaged in paragraph [0047] of the impugned patent, as stressed by the respondent.

According to D1, the heat treatment is accomplished by heating the aqueous protein *solution* (optionally comprising further additives) to a temperature between 60°C and 200°C for a period which is inversely proportional to the heating temperature, as calculated by a formula on page 14, lines 17 to 21 of D1.

3.7.6 Proteins used as matrix component in D1 are *inter alia* whey protein (a preferred globular protein in the patent in suit), and the encapsulation matrix may comprise other matrix components such as hydrocolloids, including pectin as a preferred negatively charged polymer having blockwise charge distribution of the patent in suit (see page 7, line 31 to page 8, line 2 of D1).

3.7.7 As stressed by the respondent, D1 mentions on page 16, lines 26 to 32 that the procedure disclosed therein yields microcapsules in aqueous phase which can be used in the form of oil-in-water emulsions and be applied in

beverages. This preparation method also avoids potential oxidative degradation of the oil during the drying operation.
Consequently, the teaching of D1 is not limited to the stability of dry powders as put forward by the appellant.

Example 4 of D1 features the preparation *in situ* of microcapsules in aqueous suspension. The oxidative stability of the suspension of the fish oil capsules obtained is evaluated in example 5 of D1 after 5 weeks of storage.

3.7.8 Whilst the appellant argued that no comparative examples which show the impact of the protein aggregates over (non-cross-linked) protein coacervates encapsulating fish oil are present in D1, D1 hints at markedly improving the oxygen-barrier properties of the protein-containing matrix by disulfide cross-linking: it was found that these disulfide cross-linkages enhance the ability of the protein-based matrix to protect the encapsulated oil from atmospheric oxygen, see page 3, lines 13 to 15 of D1. Moreover, cross-linking is said in D1 to render the matrix poorly water-soluble. Thus the encapsulates of D1 continue to protect the oil from oxidation even when the encapsulates are applied in products containing water, see page 3, lines 19 to 22 of D1. This passage of D1 was cited by the respondent in its reply to the grounds of appeal in the context of its argument that a skilled person would expect the improved stability obtained from D1 also to apply to acidic beverages. The board holds this argument of the respondent plausible in view of the cross-linking of the protein-based matrix of the encapsulates in D1.

3.7.9 Hence the appellant's argument that example 4 of D1 did not comprise the anionic polymer (and thus did not hint at a combination of the teaching of D5 with D1) is also not convincing in view of this general teaching of D1 and taking into account that D1 does not teach against the presence of such anionic polymers, such as pectin, as additional component in the shell matrix.

3.7.10 It follows from these considerations that the board considers the statement under section 4. of D25, that a skilled person intending to improve the stability of microcapsules against hydrolysis in acidic solutions would not consult D1, unconvincing. D1 clearly also describes improved protection of the microcapsules from oxidation in aqueous phase (*see above*).

3.7.11 The board acknowledges that D5 suggests that cross-linking reduces the release characteristics of the coacervate microcapsules. However, as observed by the respondent, the objective technical problem to be solved is not the optimisation of the release properties of the hydrophobic component in the gastrointestinal tract but the improvement of the stability of carbonated soda beverages having a pH of 1.0 to 5.5 which comprise an encapsulated hydrophobic component.

3.7.12 What is more, the board also concurs with the respondent that D5 does not categorically exclude the stabilisation of the complex coacervates other than by electrostatic interactions, but mentions that in certain embodiments they are not "substantially additionally stabilised", for example by substantial gelling, substantial cross-linking or substantial hardening of the complex-coacervate shell. Said stabilisation is believed in D5 to hinder the pH-

controlled dissociation of the complex coacervates and the resulting release of the lipophilic nutrient (see D5, right-hand column on page 2, last 2 lines - page 3, left-hand column, line 10).

3.7.13 As argued by the respondent, the cross-linking appears to render the protein matrix less water-soluble and provides the oil encapsulates of D1 with oxidative stability (see page 6, lines 3 to 7 of the document). The board thus sees no corresponding contraindication to cross-linking the protein-containing shell layers of D5. The appellant's allegation that reduced water-solubility of the protein-containing shell was undesirable in the case of microcapsules suitable for acidic beverages is thus unsubstantiated and not plausible.

3.7.14 As outlined by the respondent, poor oxidative stability leads to oxidation of fish oil, thus giving rise to rancidity and taste defects, as described in paragraph [0003] of D5.

3.7.15 As mentioned in the first-instance decision, the amount of the protein aggregates in the interface layer of the microcapsules present in the carbonated soda beverage of claim 1 is not limited and may be very small ("the interface layer comprises").

3.7.16 The board thus concludes that in a trade-off between release properties of the hydrophobic encapsulated component, such as an unsaturated fatty acid prone to oxidation in the aqueous phase, and improved stability of the coacervate capsules of D5, a skilled person would earnestly consider applying the teaching of D1 and at least partially cross-linking the coacervate shells of D5, taking possible worsened release

properties of the capsules into account. Hence, even considering the statement in item 5. of D25 describing the increased stability of coacervates e.g. against oxidation by disulfide-cross-linking at an impaired or reduced release of the hydrophobic substances, the board's conclusion remains the same.

3.7.17 The skilled person, in view of the technical teaching of D1, could expect that improved oxygen barrier properties would reduce oxidation of the fatty-acid oils and consequently reduce rancidity and off-taste as one aspect of the capsules' stability in aqueous environment. In this context, it should be noted that the dispersions of D5 and beverages comprising them are already acidic (this also being, as discussed above, a prerequisite for the stability of the coacervate complexes).

3.7.18 Likewise, as argued by the respondent and as observed in the impugned decision, D5 also teaches using the microcapsules in carbonated beverages, including carbonated soft drinks (see paragraph [0026] of D5).

3.7.19 It is for these reasons that the board holds the technical teaching of documents D1 and D5 fully compatible and holds that the subject-matter of claim 1 is obvious to a skilled person in view of D5 as closest prior art in combination with the technical teaching of D1. Therefore the subject-matter of claim 1 of auxiliary request 7 does not meet the requirements of Article 56 EPC.

3.8 The subject-matter of claim 1 of auxiliary request 6 includes the embodiments of claim 1 of auxiliary request 7. Consequently, the finding of lack of inventive step applies *mutatis mutandis* to the subject-

matter of claim 1 of auxiliary request 6 for the reasons indicated above, and it thus does not meet the requirements of Article 56 EPC either.

Auxiliary request 7a

4. Admissibility (Rule 13(2) RPBA 2020)

4.1 During the discussion of auxiliary request 6, replying to a question by the board, the respondent stated that the passage in paragraph [0016] of D5 related to the cross-linking of the cationic and anionic component and did not include merely cross-linking of the cationic polymer without also cross-linking the anionic with the cationic polymer. D1 disclosed only the cross-linking of the cationic polymer and would thus overcome the limitation of the cross-linking type of D5 (having both polymers of the shell cross-linked) of reduced release in the lower gastrointestinal tract. Thus the polymers of D1 would still allow for the dissolution of the anionic polymers out of the shell and therefore the delivery of the hydrophobic component in the lower gastrointestinal tract.

4.2 The board cannot evaluate the allegation that cross-linking as understood in D5 would involve the cross-linking of the anionic and cationic polymers, whereas cross-linking in D1 would only involve the protein matrix component. This argument, having the quality of a late-submitted alleged fact which has not been corroborated by any evidence, is thus not considered in the present decision when assessing inventive step of the subject-matter of claim 1 of auxiliary requests 6 and 7.

4.3 The appellant requested that the newly submitted auxiliary request 7a be considered should the board take said belated argument of the respondent into account in its decision. This request is therefore deprived of its basis. Apart from this finding, the board, not taking into account said new argument of the respondent in this decision, holds that no exceptional circumstances justified by cogent reasons within the meaning of Article 13(2) RPBA 2020 which would justify taking request 7a into account at such a late stage of the appeal proceedings apply. Hence auxiliary request 7a, ranking between auxiliary request 7 and auxiliary request 8 of the appellant, is not taken into account (Article 13(2) RPBA 2020).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

T. Buschek A. Haderlein

Decision electronically authenticated