Intellectual Property Office

BL O/291/19
28 May 2019

PATENTS ACT 1977

CLAIMANT	Rockwool International A/S
DEFENDANT	Knauf Insulation Limited
PROCEEDINGS	Application under section 72 for revocation of patents GB2451719 and GB2496951
HEARING OFFICER	H Jones

Mr Jonathan Moss, instructed by Gill Jennings & Every LLP, appeared for the claimant
Mr James Abrahams QC, instructed by ARC-IP, appeared for the defendant

Hearing date: 11 March 2019

DECISION

Introduction

1 Patent number GB2451719 ("the *'719 patent*") was filed on 29 April 2008 and granted to Knauf Insulation Limited ("the defendant") on 26 December 2012. The *'719 patent* claims priority from patent application GB0715100.4, which has a filing date of 3 August 2007. Patent number GB2496951 ("the '*951 patent*") is divided from the *'719 patent* and was granted to the defendant on 17 July 2013.

2 In May 2018, Rockwool International A/S ("the claimant") made applications to the comptroller under section 72(1) of the Patents Act 1977 ("the Act") for revocation of the *'719* and '*951 patent*s on the grounds that the inventions claimed were neither novel nor involved an inventive step. The claimant also requested that both patents be revoked on the grounds that the matter disclosed in the specifications extended beyond that disclosed in the applications as filed. The two proceedings for revocation were eventually consolidated.

3 On 17 July 2018 the defendant filed a counterstatement together with an unconditional request to amend the claims of the *'719* and *'951 patent*s. In both cases the defendant requested allowance of the amendments and sought refusal of the applications for revocation. The unconditional amendments proposed on the *'719 patent* were advertised for opposition on 26 September 2018 and no opposition was filed.

4 Following an official report from the Office on 10 September 2018 that the proposed amendments to the *'951 patent* disclosed subject matter not present in the patent application as filed, the defendant made a further unconditional request to amend the claims of the *'951 patent* on 21 December 2018. These amendments were advertised for opposition on 30 January 2019. Objections to the further amendments

of the *'951 patent* were filed by the claimant on 13 February 2019. The claimant's opposition to the amendments were on the grounds that they lacked a clear basis in the parent application as filed and that they did not solve the lack of novelty or lack of inventive step problems over prior art document WO 2007/014236 (labelled "D3") identified in their statement of grounds of 18 May 2018. D3 was published on 1 February 2007, some six months before the priority date of the patents in suit.

5 The claimant said that the amendments also raised a problem of enablement under section 72(1)(c), arising from the suggested discrepancy between i) the evidence in the *'951 patent* for effectiveness of the binders and the scope of the binders claimed, and ii) the defendant's statements relating to obviousness. The usual evidence rounds followed with both parties submitting reports from their respective experts.

6 The defendant filed their skeleton arguments on 5 March 2018. The claimant submitted skeleton arguments accompanied with supplemental grounds for revocation on 6 March 2019 in which they submitted that the new claims in each patent were still neither novel nor inventive having regard to prior art document D3. The claimant also submitted that the claims were not properly enabled, were not plausible and added matter not disclosed in the applications as filed. The defendant requested a ruling from me that the claimant's supplemental grounds should not be admitted into the proceedings on the basis that it was not permitted for a party to raise new grounds unilaterally; an application to amend the statement had not been made. Several rounds of correspondence ensued during which the claimant refuted that the supplemental grounds were new pleadings.

7 The matter came before me on 11 March 2019. The claimant was represented by Mr Jonathan Moss of Hogarth Chambers, instructed by Gill Jennings & Every, and the defendant by Mr James Abrahams QC of 8 New Square, instructed by ARC-IP. The issues before me were the novelty and inventiveness of the amended claims over the disclosure of prior art document D3. I was also requested to rule on the admissibility of the claimant's supplementary grounds for revocation and, if necessary decide on the issue of added matter and plausibility. Finally, the defendant requested that I issue a certificate of contested validity should I find in their favour that the patents are valid.

Granted patents and proposed amendments

8 Both the *'719* and *'951 patent*s relate to binders, particularly for the manufacture of mineral wool insulation (for example glass wool or stone wool insulation). Both patents are very similar and as far as their descriptions are concerned there is no material difference; the only differences being the claims.

9 At the hearing the claimant set out the view that if their case failed in relation to the *'719 patent*, i.e. if I found the *'719 patent* to be novel and inventive, then the same would be true of the *'951 patent*. The defendant agreed with this view and indeed all of the arguments put before me at the hearing by both parties related to the *'719 patent*.

10 As I have stated the patents relate to binder solutions particularly useful in the manufacture of mineral wool. In particular, the binders are formaldehyde free, or substantially formaldehyde free and have the advantage of being sugar-based.

11 The proposed amended claim 1 of the *'719 patent* is as follows (underlining added to illustrate what has been changed in comparison with the claim as granted):

> A method of manufacturing a mineral wool insulation product comprising
>
> a) providing a substantially formaldehyde free binder solution having a pH of greater than 6 comprising:
>
> - a carbohydrate selected from a monosaccharide, a monosaccharide in its aldose or ketose form, a reducing sugar and a carbohydrate having a reducing aldehyde;
>
> - an acid precursor derivable from an inorganic salt, in which the acid precursor comprises a species selected from the group consisting of sulphates, phosphates and nitrates;
>
> - a source of nitrogen; and
>
> - water;
>
> in which the acid precursor makes up at least 5% by dry weight of the uncured binder solution; and
>
> in which the binder comprises between 5%-25% by dry weight of acid precursor to carbohydrate;
>
> b) spraying the binder solution on to the mineral fibres between formation of the fibres and collection of the fibres to form a batt; and
>
> c) curing the binder to form a thermoset binder, in which the curing of the binder occurs in a curing oven using forced hot air circulation.

12 The proposed amended claim 1 of the *'951 patent* is as follows (strikethrough and underlining added to emphasise what has changed from the claim as granted):

> A method of manufacturing ~~a product selected from: a thermal insulation material~~ a mineral fibre product~~; a wood board product including chip board, oriented strand board, particle board, medium density fibreboard, wood facing products; and foundry sands~~ in which the mineral fibre product is a mineral wool insulation product, comprising the steps of:
>
> providing a collection of loose matter comprising non-woven ~~material~~ mineral fibres;
>
> applying a binder solution to the collection of loose matter by spraying the binder solution on to the mineral fibres between formation of the fibres and collection of the fibres to form a batt, the binder solution being a substantially formaldehyde free binder solution having a pH of greater than 6 comprising: a carbohydrate, an acid precursor derivable from an inorganic salt which makes up at least 5% by dry weight of the uncured binder solution, a source of nitrogen and water, and in which the acid precursor comprises one or more inorganic ammonium salts; and
>
> curing the binder to form a thermoset binder in which the curing of the binder occurs in a curing oven using forced hot air circulation;
>
> and in which the quantity of binder in the finished material wool insulation is greater than 1% and less than 20% measured by dry weight of the finished mineral wool insulation product.

The law

13 The law in relation to the issues before me are well known and there was no material dispute between the parties in relation to the relevant provisions and caselaw. Section 1 of the Act says that a patent may only be granted for an invention that is new and involves an inventive step. Section 2 sets out that an invention shall be taken to be new if it does not form part of the state of the art while section 3 sets out that an invention involves an inventive step if it is not obvious to a person skilled in the art, having regard to any matter which forms part of the state of the art.

14 Allowance of the defendant's proposed amendments is governed by section 75(1), and 75(2) allows another person, in the present case the claimant, to oppose any such amendment. Section 75(1) indicates that the allowability of any amendment is subject to the provisions of section 76(3) which require:

> *"76(3). No amendment of the specification of a patent shall be allowed under section 27(1), 73 or 75 if it -*
>
> *(a) results in the specification disclosing additional matter, or*
> *(b) extends the protection conferred by the patent."*

15 Section 72(1) provides authority for the comptroller to revoke a patent on the grounds that the invention is not a patentable invention within the meaning of section 1 or that the matter disclosed in the specification of the patent extends beyond that disclosed in the application for the patent as filed. Section 65 states that the comptroller may issue a certificate of contested validity if a patent is found to be wholly or partially valid in any proceedings in which the validity of the patent is contested.

The witnesses & evidence

16 The claimant put forward Ms Dorte Bartnik Johansson as an expert witness. Ms Johansson is employed by Rockwool International A/S as project manager in the Research and Development Department. She holds an MSc in Science with an expertise in organic chemistry and molecular biology, and has worked for Rockwool since 2006 as a Research Chemist developing new NAF (No Added Formaldehyde) binders, a Senior Development Engineer working on binder development and composites based on stone wool and organics, and as a project manager on projects mostly related to binder development and binder characterisation. Ms Johansson does not appear to have previous experience of intellectual property matters. However, she explains in her expert report that she has had the relevant concepts of patent law, such as the skilled person, explained to her by Gill Jennings & Every LLP.

17 Ms Johansson's evidence was directed towards what she considered to be the most appropriate definition of the person skilled in the art and their common general knowledge. Her evidence also considers what prior art document D3 would have taught the person skilled in the art in light of the common general knowledge. It is Ms Johansson's opinion that the *'719* and *'951 patent*s are not novel or inventive over the teachings of D3.

18 The defendant's expert witness was Dr Reinhard Preininger who was, prior to his retirement in 2014, an employee of Knauf Insulation Limited. Dr Preininger holds an undergraduate degree in Chemistry and Theoretical Physics and a PhD in Chemistry, and has spent a large part of his career involved in research and

development of bio-soluble stone wool fibres compatible with manufacturing of stone wool insulation products. Dr Preininger also has experience of dealing with intellectual property matters and for the four or five years prior to his retirement he divided his time equally between the binder development team and dealing with intellectual property matters.

19 Dr Preininger's evidence covers the same ground as Ms Johansson's. His evidence was prepared having seen the expert report of Ms Johansson. Dr Preininger's evidence disagrees with almost all of Ms Johansson's in relation to the definition of the person skilled in the art and the substance of their common general knowledge. I shall deal with the conflict in Ms Johansson's and Dr Preininger's evidence in my consideration of the relevant issues.

20 The defendant also put forward Mr Kevin Day as a witness. Mr Day is a Chartered Chemical Engineer and is the Industrial Performance Director, Europe for Rock Mineral Wool for Knauf Insulation. He was also the operations manager at Knauf Insulation's stone wool mineral wool insulation manufacturing plant. His evidence is directed towards his experience of using triammonium citrate-dextrose binders in Knauf Insulation plants where these are used to manufacture stone wool mineral wool insulation.

21 Three rounds of evidence were submitted ahead of the hearing. The first expert report of Ms Johansson was submitted by the claimant on 12 November 2018. The defendant then submitted the expert report of Dr Preininger and the witness statement of Mr Day on 9 January 2019. Finally, the claimant submitted a second expert report from Ms Johansson in response on 20 February 2019. The defendant also filed, on 28 February 2019, a short statement from Dr Preininger correcting a typographical error in his original expert report.

22 In the interests of procedural efficiency, the defendant and the claimant ("the Parties") agreed before the hearing to dispense with the need for cross-examination of all witnesses, on the basis that:

- *The Parties are free to criticise any part of the evidence, as if such challenge had been put to the witness in cross-examination, so long as it does not require the introduction of new documentation in the case.*
- *The Parties are free to make submissions on the weight to be given to the evidence.*
- *Neither of the Parties will question the independence or integrity of the experts or their expertise in their respective fields.*
- *The Parties will follow the direction of the Hearing Officer in the email of 25 February that each of the Parties should set out in their skeleton arguments which facts are agreed and which are in dispute. Each of the Parties will set out why the Hearing Officer should give preference to one witness over another.*

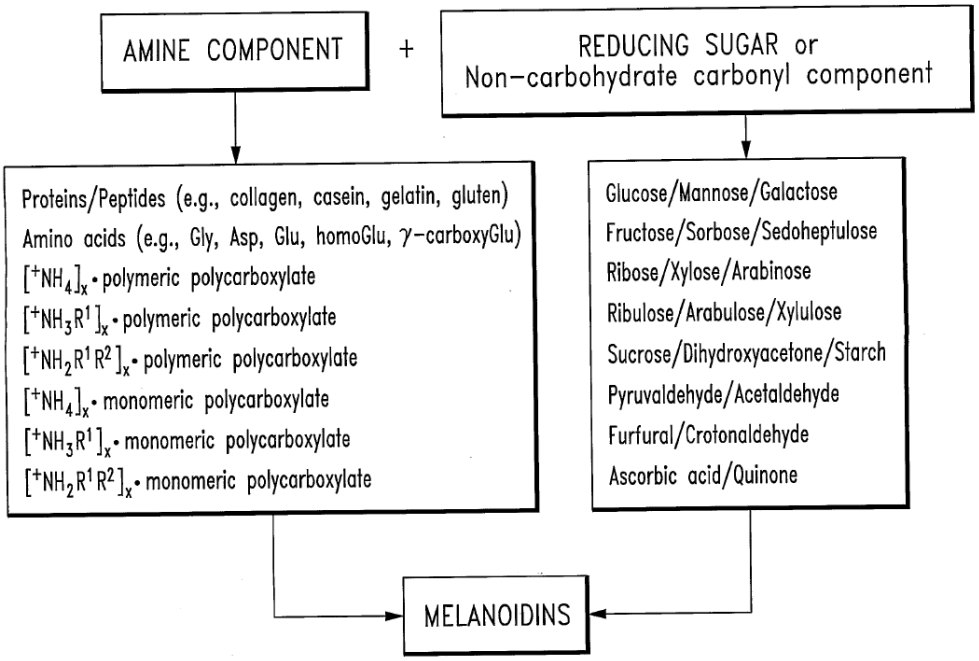
The prior art

23 The claimant seeks revocation of the *'719* and *'951 patent*s on the grounds of novelty and inventive step on the basis of prior art document D3 (WO 2007/014236). D3 relates to a formaldehyde free binder solution used in the manufacture of mineral

wool insultation. Both parties agree that the key teaching of D3 is that it provides a way to convert sugar into an insoluble three-dimensional network to be used as a binder in mineral wool insulation.

24 Binders disclosed in D3 include reactants of the Maillard reaction. The Maillard reaction is most commonly known as the reaction responsible for browning and flavouring of foods, for example roast meats. The reaction is complex (as admitted by both parties) but at a basic level it includes the reaction of an amine component (e.g. an amino acid) with a reducing sugar.

25 Figure 1 of D3 (reproduced below) sets out schematically the various components which may be combined to make the binders. Specifically, the binders of D3 are formed by a reaction of an amine component and a reducing sugar or non-carbohydrate carbonyl component. Examples of amine components include proteins, peptides, amino acids, ammonium salts of polymeric polycarboxylic acids and ammonium salts of monomeric polycarboxylic acids. Reducing-sugar components include monosaccharides, polysaccharides or a combination of both. Illustrative non-carbohydrate carbonyl reactants disclosed include various aldehydes as well as compounds such as ascorbic acid.



26 D3 discloses various examples which embody the disclosed invention, the most relevant of which are Examples 5 and 10 which relate to a specific example of a binder formed from an aqueous solution of triammonium citrate and dextrose. I shall return to these specific examples in more detail in considering the arguments on novelty and inventive step.

27 Claim 1 of D3 is directed to a binder “comprising Maillard reactants including (i) an amine and (ii) a carbohydrate, wherein the binder is (i) uncured and (ii) formaldehyde free.”

28 Claims 11 and 12, which are appendant to claim 1, add a corrosion inhibitor to the binder. The corrosion inhibitor may be one of a number of alternatives, one of which is monoammonium phosphate. Claim 13 further requires the binder of claim 1 to be "an aqueous solution having an alkaline pH".

29 Claim 23 is to a material "comprising a collection of matter; and a binder disposed on the matter; wherein the material is formaldehyde free; and the binder includes (i) at least two Maillard reactants and (ii) a silicon-containing compound."

30 Claim 26 is to a material *"comprising a collection of matter; and a binder disposed on the matter; wherein the material is formaldehyde free; and the binder includes (i) at least two Maillard reactants and (ii) a corrosion inhibitor."*

The person skilled in the art and the common general knowledge

31 The identity of the person skilled in the art and the common general knowledge of that person are of material importance in reaching a decision on the issues before me. I was addressed at length by both parties as to the identity of the skilled person, what they would understand to be common general knowledge and how that knowledge would guide their understanding of the teachings of the prior art document D3 and the *'719* and *'951 patent*s.

32 The claimant's position as set out in their statement of claim is that the person skilled in the art was one having expertise in chemistry and several years' experience in the development of binder solutions. This position was further refined in the skeleton arguments where, based on the evidence of Ms Johansson's first report, the person skilled in the art would be a team constituted of:

- a chemical engineer, who would work on producing the binders and carry out production testing;
- an organic chemist with specific knowledge of polymer chemistry, who would work on the development and formulation of the binder; and
- persons who carried out testing and quality assurance (e.g. laboratory assistants and quality assurance team members).

33 Ms Johansson's view is based on her own experience of the team she joined at Rockwool International, but it is not a complete copy; for example, her team also included inorganic chemists, but she does not consider such persons would be members of the skilled team (although the organic chemist in the team would have basic knowledge of inorganic chemistry due to their undergraduate chemistry training).

34 Ms Johansson's evidence is that the skilled person working in this field would not just rely on their knowledge obtained from their own studies, but they would also conduct searches of the relevant chemical and industrial scientific literature, and would analyse competitors' publications, patents and marketing material. In her view, the skilled person would not limit themselves to the field of binders for insulation but would also look to the related fields of gluing, paint and chipboard as binders in these fields have similarities with those in mineral wool, e.g. all comprise inorganic materials held together with organic or inorganic binders.

35 Based on Ms Johansson's evidence, the claimant argued that, at the priority date, the skilled team would have advanced knowledge of general chemistry and a specific knowledge of binder formulations and typical compositions. They would also have a detailed knowledge of the Maillard reaction due to it being used in the field of binders. The skilled team would be aware of the origins of the Maillard reaction in food chemistry but also of its more recent use in the formation of binders. Indeed, D3 incorporates by reference prior art documents providing detailed descriptions of the Maillard reaction.

36 The defendant's position, based on Dr Preininger's evidence, is that the person skilled in the art is an industrial production chemist or chemical engineer who is familiar with issues related to binders in the manufacture of mineral wool insulation and for associated manufacturing and product issues related to the binder. Dr Preininger's view of the skilled person is based on the fact that the claims of the *'719* and *'951 patent*s as granted related to methods of manufacturing mineral wool insulation. Dr Preininger's view is that the skilled person should be considered to have a degree in chemistry and at least 5 years of practical experience in the manufacture of wool insulation. He would not expect the skilled person to have a PhD or to be involved in or experienced in scientific research.

37 The defendant's position of the skilled person's common general knowledge it that it comprises:

- a general knowledge of chemistry;
- a detailed knowledge of binders used in the manufacture of mineral wool insulation, but not binders used in other fields;
- a detailed knowledge of the practical aspects required for binders used in the manufacture of mineral wool insulation;
- a general knowledge of binders which have been commonly used or widely proposed for the manufacture of mineral wool insulation. In particular, they would know that the predominant binder type was PUF (urea-modified phenol formaldehyde binders);
- an awareness of attempts within the mineral wool insulation industry to replace the predominant PUF binders; and
- a general awareness of the Maillard reaction, of its importance for food science and that the reaction is incredibly complex.

38 Both parties agree that the person (or team) skilled in the art is a chemist and/or chemical engineer engaged in development of binder solutions. The claimant does not restrict the skilled person to the field of binder solutions for the manufacture of mineral wool insulation. However, the defendant defines the skilled person more narrowly and requires them to be working in the field of mineral wool insulation manufacture.

39 A key point of contention between the parties is the extent to which the person (or team) skilled in the art would know about the Maillard reaction. The claimant says they would have a detailed knowledge whereas the defendant asserts that only an awareness of the reaction is known. The claimant points to the fact that the prior art document D3 not only makes mention of the Maillard reaction but also incorporates by reference other prior art documents which provide more detailed information

about the reaction. Furthermore, Ms Johansson's evidence provides further prior art to show that the details of the Maillard reaction were known at the priority date.

40 The defendant countered this view by arguing that all of the prior art related to the Maillard reaction came from the food chemistry and agricultural industry. In the defendant's view, no one ever considered the Maillard reaction outside of these areas and so the person skilled in the art of binders for the manufacture of mineral wool insulation would not consider a detailed knowledge of the reaction as common general knowledge.

41 In response to the claimant's arguments that the skilled person would have a detailed knowledge of the Maillard reaction by virtue of prior art documents D5-D10 incorporated into D3 by reference, the defendant addressed me at the hearing on the skilled person's level of interest as a matter of law. Specifically, Mr Abrahams referred to the comments of HHJ Birss (as he was then) in *Vernacare v Environmental Pulp Products*[1] (at paragraph 41):

> *"As a matter of principle, the skilled person reads any given piece of prior art with interest. However, as a matter of principle again, once they have done so there is nothing to say as a matter of law the skilled person is not entitled to say having read it with interest, 'I have read it with interest, but I am not interested.' The context is vital"*

42 The defendant's position is that although the skilled person would know of D3 and the prior art which it incorporates by reference, they would not have detailed knowledge of the Maillard reaction. Essentially, they can be assumed to have read the prior art with interest but are not interested.

43 The person skilled in the art is the person to whom the patent is addressed. It is through their eyes that I must read and interpret the patents before me and the prior art. Therefore, I must look to the *'719* and *'951 patent*s and determine to whom they are addressed. Both patents, including the claims, relate to binders, particularly for the manufacture of mineral wool insulation and to methods of manufacturing mineral wool insulation using such binders. Therefore, in my view the person to whom the *'719* and *'951 patent*s are addressed is one who is interested in the development of binders in the field of mineral wool insulation manufacture. Such a person would have knowledge of chemistry and detailed knowledge of binders used in mineral wool insultation.

44 In my view, the person skilled in the art would be aware of the Maillard reaction and its relevance to making formaldehyde free binders for mineral wool insultation. They are aware of this from the disclosure in D3 which shows the skilled person that it is possible to make sugar-based, formaldehyde free binders from so-called Maillard reactants. I disagree with the claimant's view that the person skilled in the art would have a detailed knowledge of the reaction simply because they have read what is in D3 and other documents to which D3 refers. Literature on the Maillard reaction has been largely confined to the field of food chemistry and its relevance to binders for mineral wool insultation is relatively new. Therefore, I think it unlikely that the person skilled in the art of binders for the manufacture of mineral wool insulation would have detailed knowledge of the Maillard reaction as part of their common general knowledge.

[1] Vernacare v Environmental Pulp Products [2012] EWPCC 41

Novelty & inventive step

Construction of the claim

45 Both parties agree that the claims of the *'719* and *'951 patent*s are directed towards methods of manufacturing a mineral wool insulation product. They also agree on the meaning of most of the constituent steps of the methods and the components and properties of the binder solution. What is in dispute is the proper construction of one element of claim 1 in each patent, which is:

> "an acid precursor derivable from an inorganic salt, in which the acid precursor comprises a species selected from the group consisting of sulphates, phosphate and nitrates".

46 The claimant focussed on the interaction between the words "derivable from" and "species". In their view, the skilled person would know that "derivable from" would not be limited to an acid precursor being directly derivable from an inorganic salt. In chemical reactions there can be many steps in the production of a composition and so the term "derivable from" should not be limited to cover the immediate productions of a reaction. Thus, in the claimant's view the claims are not limited to acid precursors which are directly the product of a reaction involving an inorganic salt.

47 The second part of the claimant's argument focussed on the meaning of the word "species" in the context of claim 1. They put forward two possible constructions:

- the "species" is one constituent element of the compound that is the acid precursor, i.e. the acid precursor component must have a functional group which is a sulphate, phosphate, or nitrate;
- the "species" refers to the entire compound in which the acid precursor is present, i.e. the acid precursor can be a mixture of compounds some of which (but not all) have to contain sulphate, phosphate, or nitrate groups but the part acting as the acid precursor would not necessarily have to have sulphate, phosphate, or nitrate groups.

48 The claimant argued that the second of these meanings is the proper construction. The reason for this view seems to me to be that this is the construction which favours their arguments for revocation of the patents; indeed, at the hearing, Mr Moss accepted that the claimant's attack on the novelty of the claims only succeeds if the second of these possible meanings of "species" was the proper construction.

49 At the hearing the defendant accepted that in chemical reactions it was possible to derive a composition' from almost anything given enough steps but that there had to be some limits based on the context of the claim as a whole when read in light of the description. Specifically, they pointed to the additional words later in amended claim 1 where it states, *"in which the acid precursor makes up at least 5% by dry weight of the uncured binder solution".* The addition of this further requirement makes it clear, in the defendant's view, that it is the acid precursor part itself which must comprise a sulphate, phosphate or nitrate group, i.e. the first meaning put forward by the claimant is the proper construction.

50 It is well-established law that a patent should be given a purposive construction[2] and that the meaning of words in the claim is what the skilled person would have understood the author to mean by using these words[3]. In my view, the person skilled in the art reading the *'719* or *'951 patent*s would consider that it is the acid precursor component itself that must have a sulphate, phosphate or nitrate group. The examples which demonstrate the embodiments of the claims require ammonium sulphate and ammonium phosphate as the inorganic salts which act as acid precursors. Therefore, it appears to me that the proper construction is that of the first meaning put forward by the claimant.

Novelty

51 The claimant's attack on the claims of the *'719* and *'951 patent*s on grounds of novelty relies on a specific interpretation of the claim, specifically that the sulphate, phosphate or nitrate species need only be present in some part of the binder solution in which the acid precursor is present rather than in the acid precursor part itself. I have already concluded that this is not the correct construction of the claims and therefore it would appear that the claimant's case for revocation on grounds of novelty lack merit. However, it is worth setting out the claimant's arguments of how D3 discloses the components of the present claims and the defendant's rebuttal.

52 The claimant explains that D3 was an important development in the field of manufacturing mineral wool insulation, as it showed that sugar-based binders could be used successfully to create a formaldehyde-free binder. While sugar-containing binders were known before D3, as evidenced by Ms Johansson's expert report, the claimant says that D3 was the first to really show that this could be successful with sugar being used as such a key component - the obvious benefit then being that as sugar was so cheap it significantly reduced the cost of the binder.

53 The claimant helpfully presented the integers of amended claim 1 of both patents in their skeleton argument and pointed to the parts in D3 where each integer was disclosed. I shall focus on those parts of the claim where there was dispute between the parties, which are:

- an acid precursor derivable from an inorganic salt,
- in which the acid precursor comprises a species selected from the group consisting of sulphates, phosphates and nitrates;
- in which the acid precursor makes up at least 5% by dry weight of the uncured binder solution;

54 D3 discloses the use of triammonium citrate as an acid precursor. The claimant argues (paragraph 9 of the statement of claim) that the person skilled in the art would be perfectly capable of deriving triammonium citrate from an inorganic salt, for instance by combining ammonium sulphate in solution with sodium citrate solution. However, D3 is not limited to citric acid and it refers to binders which may also include potassium salts of inorganic acids.

55 The defendant accepted that D3 does not specify that only citric acid can be used but they point out that the only other acids mentioned in detail are "suitable"

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[2] Catnic Components Ltd and another v Hill and Smith Ltd [1982] RPC 183
[3] Kirin-Amgen Inc v Hoechst Marion Roussel Ltd [2005] RPC 9

polycarboxylic acids. The defendant also points out that while the binders of D3 may include potassium salts of organic acids and potassium salts of inorganics acids, there is no suggestion of ammonium salts. They explain this by the fact that the potassium salts of inorganic acids are not present as acid precursors but as corrosion inhibitors.

56 It is my view that D3 does not disclose an acid precursor derivable from an inorganic salt in which the acid precursor (itself, rather than the binder solution as a whole) comprises a sulphate, phosphate or nitrate group. Therefore, I find that the claims of the *'719* and *'951 patent*s are novel.

Inventive step

57 Both parties addressed me on the matter of inventive step using the *Pozzoli*[4] test. The first steps of identifying the person skilled in the art and the common general knowledge have already been addressed above. Therefore, I shall start my assessment of inventive step from the point of identifying the inventive concept of the claims and the differences with the prior art.

58 Both parties agreed that the inventive concept of the *'719* and *'951 patent*s is the formation of a sugar-based binder characterised by the inclusion of an acid precursor derivable from an inorganic salt, and that the technical difference between D3 and the patents is the use of an organic acid (specifically triammonium citrate) in D3 compared to the use of an inorganic acid (specifically acids based on sulphate, phosphate or nitrate salts) in the patents in suit.

59 The patents describe how it would have been thought that the nature of the acid used would have a significant effect upon the properties of the cured binder, particularly if the acid precursor and/or a derivative therefrom is incorporated into the structure of the cured binder. They suggest that it is therefore surprising that an acid precursor derivable from an inorganic salt should provide a suitable acid precursor in an otherwise apparently similar binder system. They also explain the benefits of using an acid precursor derivable from an inorganic salt, e.g. in terms of cost, availability and ease of handling. They say that a particular advantage can be achieved by use of one or more inorganic ammonium salts, for example, an ammonium sulphate or an ammonium phosphate: an ammonium salt may provide the or part of the acid precursor and/or the or part of the source of nitrogen and/or the or part of a pH control system. They also say that an ammonium nitrate may also work but explain that ammonium nitrate may oxidise aldehyde groups of the carbohydrate (for example in the case of dextrose) and/or require precautions to avoid explosions.

60 The claimant argues that there are multiple reasons why the person skilled in the art would be motivated to try using different acids in seeking to improve upon the invention as exemplified in Examples 5 and 10 of D3. Ms Johansson's evidence points to certain disadvantages of using citric acid in the method of D3 which they say the person skilled in the art would consider as common general knowledge. Ms Johansson states, with reference to prior art[5], that it would be commonly known that

[4] *Pozzoli SPA v BDMO SA [2007] EWCA Civ 588, paragraph 23*
[5] Dissolution behaviour of biosoluble HT stone wool, T Steenberg et al., Glasstech. Ber. Glass Sci. Technol. 74 (2001) No.4

citric acid would have a detrimental effect on stone wool fibres causing the fibres to break down.

61 In the claimant's view, the skilled person would be further motivated to consider changing the citric acid in D3 because it is known that citrate degrades at the binder curing temperatures disclosed in D3 to form carcinogenic by-products. The skilled person would be motivated to avoid such by-products and would therefore seek to use another acid. Sulphate or phosphate ions are known to not degrade to form unhealthy or carcinogenic compounds and thus they would be obvious alternatives to try.

62 In deciding which acid to use, the skilled person would be directed towards D10[6] (a document explicitly cross-referenced by D3). D10 teaches that an amine salt (i.e. ammonium citrate) catalyses the polymerisation stage of the Maillard reaction. This is the stage of the reaction that is associated with the production of melanoidins which is repeatedly taught in D3 as being the main polymeric product of the binder curing reaction. This, according to the claimant, would motivate the skilled person to try another amine salt to see if it acts as a more effective catalyst in the reaction. Ammonium sulphates and ammonium phosphates are known to work as curing agents. Ammonium sulphate, in particular, is the curing agent used in the phenol-formaldehyde binders and these reactions were the industry standard at the priority date of the *'719* and *'951 patent*s.

63 As a further argument, the claimant also points to the large extent of testing which is necessary in this technical field. Predicting outcomes in the field is difficult and therefore the skilled person would test relatively widely. Ms Johansson's evidence highlights that it is usual to screen many ideas in the laboratory to see what might then be carried forward to production line testing. Tests are easy and quick, and a good result is easily identifiable.

64 The defendant agrees that that the difference between D3 and the patents in suit is the replacement of triammonium citrate acid precursor salt in Examples 5 and 10 of D3 with an acid precursor that comprises a sulphate, phosphate or nitrate group. The defendant also accepts that the skilled person is assumed to want to improve upon the prior art, i.e. to want to make a better binder. The question is whether the improvement made in the *'719* and *'951 patent*s is an obvious one or not. In the defendant's view, the claimant's arguments for the substitution of triammonium citrate with a sulphate, phosphate or nitrate salt are driven entirely by hindsight.

65 The defendant argues that because the skilled person does not have detailed knowledge or understanding of the Maillard reaction, they would not consider changing the examples given in D3 and use different acids to the citric acid when they don't know if they will work. They argue that the claimant's pleading relies on combining information about the Maillard reaction from prior art from the very different field of food science.

66 Even if the skilled person did consider changing the reactants in the examples of D3, they would not consider a phosphate or sulphate. D3 provides alternative amine components to try, as shown in figure 1, which include proteins, peptides, amino acids and some polycarboxylates. However, D3 does not include phosphates and sulphates in the range of reactants to try. The only alternative to triammonium citrate

[6] Dehydrated foods, Chemistry of browning reactions in model systems, J.E. Hodge, J. Agric. Food Chem., 1953, 1(15), pp928-943

is another polycarboxylic acid. While D3 makes mention of using inorganic salts, these are present as corrosion inhibitors at a maximum concentration of 2%, not as a reactant as is the case in the *'719* and *'951 patent* claims (as proposed to be amended).

67 Furthermore, the properties of citric acid are very different to those of the inorganic acids based on sulphates and phosphates that the claimant proposes would be obvious to try. I was addressed at length by both parties on the effect of changing the acid and whether the skilled person would assume that this would change the outcome of the reaction. Ms Johansson appears to be of the view that changing the acid would have an effect while Dr Preininger appears to say that you would not know if it would have an effect or not. The defendant's case is that both experts agree (or at least they do not disagree) that it is not clear what the effect would be, i.e. would it be a negative or positive effect. This, in the defendant's view, points to there being no motivation to try a different acid.

68 Finally, the defendant argues that even if the skilled person did indeed think of trying ammonium sulphate or ammonium phosphate, they would have no expectation of success. The mechanism proposed for forming the binder is described on page 17 of D3. This passage describes the process by which esterification processes may occur involving the polycarboxylic acids leading to extensive crosslinking which forms the insoluble network of sugar that binds the fibres of the wool insulation. According to the defendant, the skilled person did not know before they read D3 that it was possible to create a binder from sugar in this way, nor did they have any detailed knowledge of the Maillard reaction. Therefore, the skilled person would have no choice but to accept the proposed mechanism on page 17 of D3. They would not be able to come up with an alternative theory and would not think to use any other acid than those suggested by D3. Essentially, the skilled person would not expect that substituting a phosphate or sulphate for the citrate would work.

69 As I have set out above, it is my view that the person skilled in the art is one who is interested in the development of binders in the field of mineral wool insulation manufacture. They would have knowledge of the Maillard reaction but not the detailed level of knowledge and understanding as pleaded by claimant. The inventive concept of the *'719* and *'951 patent*s is the formation of a sugar-based binder characterised by the inclusion of an acid precursor derivable from an inorganic salt where the acid precursor comprises a sulphate, phosphate or nitrate group. The difference between this and the prior art (D3) is that the prior art binder comprises an organic acid precursor, most commonly a polycarboxylic acid (in particular a citric acid - triammonium citrate).

70 The claimant put forward well-reasoned, coherent and detailed arguments for why it would be obvious to substitute citrate with phosphate or sulphate. However, their arguments are based on the starting point that the common general knowledge includes detailed understanding of the Maillard reaction. In my view the skilled person lacks the detailed understanding required by the claimant's line of argument. Therefore, I consider it unlikely that the skilled person, in the absence of a deep and detailed knowledge of the Maillard reaction would find it obvious to try alternative acids beyond those suggested in D3 (as summarised for example in figure 1). The fact that ammonium sulphates and ammonium phosphates are known to work as curing agents and that ammonium sulphate is the curing agent used in the phenol-formaldehyde binders is not a convincing argument in my view because the

chemistry involved in the present formaldehyde-free binders is different to that of the prior art formaldehyde containing binders.

71 Taking all of this into account, I find that the claims of the *'719* and *'951 patent*s as they have been proposed to be amended are inventive over the disclosure of D3.

Admissibility of claimant's supplementary grounds

72 I shall now deal with the defendant's request for a ruling that the claimant's "Supplemental Grounds", filed on 6 March 2019, are inadmissible. The defendant's position is that the claimant has unilaterally raised new grounds which had not been raised in the original Statement of Grounds or in their correspondence dated 27 February 2019. In that correspondence the claimant set out the issues it intended to pursue at the hearing as follows:

> "*1. Since the amendments requested were unconditional, the issues will be limited to the patents as amended (i.e. the '719 patent as requested for amendment in your client's counterstatement and the '951 patent as requested for amendment on 21 December 2018);*
> *2. We maintain that the Patents as amended are not novel over D3: WO 2007/014236.*
> *3. As regards D3: WO 2007/014236 and inventive step, the issues consist of:*
> *a. the identity of the person skilled in the art (and, consequently, the relevant Common General Knowledge);*
> *b. the inventive concept in the Patents as amended (including the question of whether the full scope of the claim is plausibly enabled);*
> *c. the differences between D3: WO 2007/014236 and the inventive concept in the Patents as amended; and*
> *d. whether those differences would constitute steps which would have been obvious to the person skilled in the art or would have required a degree of invention; and*
> *4. Basis for the amendments in the '951 patent as requested for amendment on 21 December 2018*.".

73 The defendant identified two examples in particular which they say were not previously foreshadowed:

- the "Supplemental Grounds" relied on parts of the specification of D3 which were not relevant to Example 5 in pleading novelty, whereas in the original pleading arguments the novelty objections relied on, and only on, Example 5 of D3

- the grounds on added matter in relation to the *'719 patent* in the "Supplemental Grounds" had not been pleaded in any way previously.

74 The defendant says that matters not included in the statement or counterstatement as originally filed cannot be raised at the hearing unless they have been allowed to be introduced into the statement or counterstatement by way of amendment [7]. Furthermore, amendment of the application for revocation, the statement or the counterstatement is allowable only upon request and with the leave of the

[7] *Bradford Dyers Association Ltd's Application*, [1966] FSR 79 and *Roussel-Uclaf (Joly and Warmant's) Patent*, [1971] RPC 304

comptroller. Since no such request had been made and no such leave given, the defendant says that I should not admit the "Supplemental Grounds" into the proceedings and that I limit the hearing only to the issues identified in the correspondence of 27 February 2019.

75 The claimant contests that the "Supplemental Grounds" do not raise new pleadings. They say that the document is merely intended to confirm the same case is run against the amended claims as was run against the unamended claims in the original statement. With regard to the arguments on novelty and inventive step, the claimant's position is that the grounds for revocation have always been in relation to the disclosure of D3 ""in particular" Example 5 but not solely Example 5". They admit that the omission of added matter grounds was made in error in their correspondence of 27 February 2019. Nevertheless, they point out that I will have to consider added matter of the amended claims as a matter of course under section 75, irrespective of their comments in the "Supplemental Grounds". Therefore, the defendant has not been disadvantaged.

76 I have considered the concerns raised by the defendant regarding the "Supplemental Grounds" and I am satisfied that the document is not an attempt by the claimant to introduce new grounds for revocation. Rather, it is my view that the intention is to focus the grounds on those issues that remain in light of the amended claims. I must consider the issue of added matter irrespective of what information the claimant has provided. Therefore, I find that the information presented by the claimant in their "Supplemental Grounds" document can be admitted.

Plausibility and added matter

77 The claimant concedes that the amended claims of the *'719 patent* have a literal basis in the application as filed but that they add matter because embodiments are claimed which would not have been regarded by the skilled person as having been credibly taught by the application at the filing date. In particular, they argue that the skilled person at the filing date would not have thought that ammonium phosphate and ammonium nitrate could make effective acid precursors and that the only example given used ammonium sulphate.

78 In relation to the *'951 patent*, the claimant argues that there is cherry-picking of features from various parts of the original disclosure but no clear basis for the particular combination of features that have been introduced in the amended claim 1.

79 The claimant also pleaded in the original statement of grounds that claim 1 as granted extended the scope of protection because the pH range for the binder solution had been extended from 7 (as originally disclosed) to 6. This argument was not presented before me at the hearing in relation to the amended claims. However, since a pH of greater than 6 is a feature of the binder in the amended claims, I shall consider the point raised.

80 In their skeleton arguments, the defendant highlighted the key passages from the applications as filed which supported the amendments to the claims. They also covered the point raised by the claimant regarding the extension of the pH range of the binder.

81 The amended claims before me have been referred to an IPO examiner for a *prima facie* view on their allowability. I have had the benefit of their reports which confirm

their *prima facie* view that the amendments do not add mater or extend the scope of protection conferred by the patents.

82 Having considered all the information before me I am satisfied that the claims as granted and as amended do not add matter nor do they extend the scope of protection conferred by the patents. I am also satisfied that the patents sufficiently disclose the inventions across the whole scope of the amended claims.

Conclusion

83 I have found that the *'719* and *'951 patents* as proposed to be amended are novel and involve an inventive step over document D3. The proposed claims do not disclose additional matter nor do they extend the scope of protection conferred. The inventions are sufficiently disclosed across the whole scope of the amended claims. I will allow the defendant to amend the claims in the manner proposed and make no order for revocation of the patents.

Certificate of contested validity

84 The defendant has requested a certificate of contested validity in the event that I find that the patents as proposed to be amended are valid. As such, I certify that the validity of GB2451719 and the validity GB2496951 have been contested on the grounds of lack of novelty, lack of inventive step, insufficiency of disclosure and added subject matter and I find that the patents as amended have been found to be valid.

Costs

85 Knauf Insulation Limited have successfully defended their patents in these proceedings and are therefore entitled to an award of costs in their favour. Neither side has suggested that I should depart from the standard published scale of costs set out at Annex A of Tribunal Practice Notice 2/2016[8], and based on how these proceedings have progressed I see no reason why I should do so. I determine the amount of the award in favour of Knauf Insulation Limited as follows:

- Preparing a statement and considering the other side's statement: £400
- Preparing evidence and considering and commenting on the other side's evidence: £700
- Preparing for and attending a hearing: £1500
- Total: £2600

86 I hereby order Rockwool International A/S to pay Knauf Insulation Limited the sum of £2600 as a contribution towards their costs in these proceedings, this sum to be paid within seven days of the expiry of the appeal period specified below.

[8] https://www.gov.uk/government/publications/tribunal-practice-notice-22016/tribunal-practice-notice-22016-costs-in-proceedings-before-the-comptroller

Appeal

87 Any appeal must be lodged within 28 days after the date of this decision.

H Jones
Deputy Director, acting for the Comptroller