

*THIS OPINION WAS NOT WRITTEN FOR PUBLICATION*

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 12

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* KONSTANTINOS KOURTAKIS, HORACIO E. BERGNA,  
GEORGE C. SONNICHSEN, DAVID R. CORBIN and  
LOREN D. BRAKE

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Appeal No. 1996-3674  
Application No. 08/451,826

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ON BRIEF

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Before WINTERS, GARRIS, and SPIEGEL, *Administrative Patent Judges*.

SPIEGEL, *Administrative Patent Judge*.

*DECISION ON APPEAL*

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 7 through 11 and 14, which are all of the claims pending in this application. Claim 7 is illustrative:

7. A process for the production of an attrition resistant catalyst composition comprising the steps of:

(a) blending one or more acidic zeolites selected from the group consisting of rho and chabazite with one or more particulate binders selected from the group

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consisting of kaolin, bentonite, alpha-alumina, and titania, at a ratio of from about 25 to about 75 weight %;

(b) adding the blend to water to yield a slurry of about 10 to about 55 weight percent solids;

(c) spray drying the slurry to form microspherical particles comprising a composite of zeolite and binder; and

(d) calcining the particles at a temperature of about 500 to 750E C.

The references relied on by the examiner are:

Bergna et al. (Bergna)	4,683,334	Jul. 28, 1987
Abrams et al. (Abrams)	4,814,503	Mar. 21, 1989
Beck et al. (Beck)	5,250,484	Oct. 5, 1993

THE CONDENSED CHEMICAL DICTIONARY 777 (10th ed., Van Nostrand Reinhold Company, New York 1981).

The references relied on by appellants in their brief (page 8)<sup>1</sup> are:

Bemrose et al. (Bemrose), "A Review of Attrition and Attrition Test Methods," 49 *Powder Technology* 97-126 (1987).

Contractor et al. (Contractor), "Attrition Resistant Catalysts for Fluidized Bed Systems," in *Engineering Foundation*, New York, 589-596 (1989).

C. Satterfield, HETEROGENOUS CATALYSIS IN INDUSTRIAL PRACTICE 89-93 (2nd edition, McGraw-Hill, New York 1991).

Claims 7, 8, 11 and 14 stand rejected under 35 U.S.C. § 103 as being unpatentable over Bergna in view of Abrams or Beck. Claims 9 and 10 stand rejected under 35 U.S.C. § 103 as being

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<sup>1</sup>These three references were originally submitted as an attachment to the amendment filed October 10, 1995 (Paper No. 7) "to illustrate that it is possible for a catalyst composition to be attrition resistant but not crush resistant, or vis versa" (page 8, first full paragraph).

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unpatentable over Bergna in view of Abrams or Beck as applied to claims 7, 8, 11 and 14, and further in view of THE CHEMICAL CONDENSED DICTIONARY. We REVERSE both rejections.

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims and to the respective positions articulated by the appellants and the examiner. We make reference to the examiner's answer (Paper No. 11, mailed April 2, 1996) for the examiner's reasoning in support of the rejection and to the appellants' brief (Paper No. 10, filed March 20, 1996) for the appellants' arguments thereagainst.

#### *THE INVENTION*

Appellants' claimed invention is directed to a process for producing an attrition resistant catalyst composition comprising (1) blending one or more acidic zeolites selected from rho and chabazite with one or more particulate binders selected from kaolin, bentonite, alpha-alumina, and titania at a ratio of from about 25 to 75 weight percent, (2) adding the blend to water to yield a slurry of about 10 to about 55 weight percent solids, (3) spray drying the slurry to form microspherical particles comprising a composite of zeolite and binder, and (4) calcining the particles at temperature of about 500 to 750E C to produce the attrition resistant catalyst composition (brief, page 3).

#### *OPINION*

Bergna discloses acidic zeolite catalysts selected from the group consisting of chabazite, erionite, ZK-5 and rho which have been modified by depositing thereon at least 0.05 weight % of at

least one element selected from the group consisting of silicon, aluminum, phosphorus and boron, which catalysts are useful for producing dimethylamine (DMA) (col. 4, lines 44-58). Zeolite rho synthesized in a Na-Cs form is converted to the H<sup>+</sup>-form by exchanging the Na<sup>+</sup> and Cs<sup>+</sup> ions for NH<sub>4</sub><sup>+</sup> ions and deammoniating by calcination at 400EC to 800EC (col. 6, lines 57-63). Zeolite H<sup>+</sup>-rho which was further treated with tetraethylorthosilicate before calcination had improved selectivity for DMA (col. 14, line 47 - col. 15, line 22). Ammoniated zeolite chabazite is also converted to its H<sup>+</sup>-form by calcination, generally from 400EC to 600EC (col. 8, lines 28-36). Modified zeolites are generally calcined at various temperatures between 300EC to 800EC for 2 to 24 hours, depending upon the element used to treat the zeolite (col. 12, lines 15-18; col. 13, lines 10-12 and 32-35). The zeolite catalyst may also be combined with matrix materials, e.g., clays, silica and/or metal oxides, which are resistant to the temperature or other conditions of a DMA production process (col. 17, lines 39-44).

Abrams discloses that calcining an acidic zeolite rho catalyst at a temperature of about 475EC to about 825EC in the presence of steam provides a catalyst with higher activity and higher selectivity for DMA (col. 4, lines 32-35 and 53-59). The catalyst may also be combined with matrix materials, e.g., clays, silica, alumina, and other metal oxides, which are resistant to the temperature or other conditions of a process for producing DMA (col. 13, lines 7-12; abstract).

Beck discloses combining acidic porous crystalline materials with matrix materials, e.g., clays, silica and/or metal oxides, which are resistant to temperature and other conditions employed in organic conversion processes (col. 4, lines 36-42). Zeolites are frequently combined with clays, e.g., bentonite and kaolin, which function, in part, as a binder (col. 4, lines 52-56). Porous matrix materials, e.g., silica, alumina, zirconia, titania, silica-alumina, silica-magnesia, silica-thoria, silica-beryllia, silica-titania, silica-alumina-zirconia, silica-alumina-magnesia, and silica-magnesia-zirconia, can also be used (col. 5, lines 3-10). Silica is preferred because of its relative inertness for acid-catalyzed reactions (col. 5, lines 13- 16). The relative proportions of the acidic porous crystalline material and inorganic oxide matrix material may vary widely, with the acidic porous crystalline material content ranging from about 1 to about 90 weight %, preferably from about 2 to about 50 weight % of the composite (col. 5, lines 16-21).

THE CONDENSED CHEMICAL DICTIONARY discloses that the smaller the particle, the greater the total exposed surface area of a given volume; therefore, since activity is a direct function of surface area, the smaller a particle is the more efficiently it will react both chemically and physically.

According to the examiner, Bergna “does not teach the amounts of materials as claimed and calcination temperatures as claimed, the spray drying as claimed, or the use of the specific binders claimed” (answer, page 3) “the particle sizes claimed” (answer, page 6). However, given that “Abrams et al. teach that the calcination temperature is an adjustable process parameter” and that “Beck et al.

teaches that the amount of binder ... can also be varied,” it “would have been obvious to one of ordinary skill in the art at the time the invention was made to select the portion of the prior art’s range which is within the range of applicant’s claims” (answer, paragraph bridging pages 3-4). According to the examiner, since “spray drying catalyst particles of zeolite and matrix material is a technique well known in the art that is used to dry and form zeolite catalyst particles,” its use in the process of Bergna would have been obvious (answer, page 4, first full paragraph). The examiner further concluded that it would have been obvious to one of ordinary skill in the art to use the specifically claimed binders with the catalysts of Bergna “because of the art recognized functional equivalency of the components taught by Bergna et al. and Beck et al. (i.e. a matrix material for use with a zeolite catalyst in order to improve heat resistance to the catalyst)” (answer, paragraph bridging pages 4-5). Moreover, “the art recognized functional equivalence of the matrices taught by Bergna et al. and Abrams et al. would provide motivation to one of ordinary skill in the art to have used the alumina [matrix material] in the process of Bergna et al. as claimed” (answer, page 5, first paragraph). Finally, given that THE CONDENSED CHEMICAL DICTIONARY teaches that smaller particle sizes result in greater reaction efficiency, it would have been both within routine skill and obvious to the skilled artisan “to determine and create the optimum or workable particle sizes” (answer, page 6, second paragraph).

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To establish a *prima facie* case of obviousness, there must be both some suggestion or motivation to modify the reference or combine reference teachings and a reasonable expectation of success. Furthermore, the prior art must teach or suggest all the claim limitations.

According to appellants, “none [of Bergna, Abrams or Beck] teach or suggest the process specifics or starting materials necessary to obtain the property of attrition resistance (as specifically defined in the Appellants’ specification),” i.e., “a process for producing an attrition resistant catalyst composition made by initially blending one or more specific acidic zeolites and one or more specific particulate binders” (emphasis in the original, brief, page 7, first full paragraph) and “The Condensed Chemical Dictionary adds nothing else” (brief, page 13, third paragraph).

Generally, the preamble of a claim does not limit the scope of a claim when it merely recites a purpose or intended use of the invention, *DeGeorge v. Bernier*, 768 F.2d 1318, 1322 n.3, 226 USPQ 758, 761 n.3 (Fed. Cir. 1985), unless it breathes life and meaning into the claim, i.e., is “essential to point out the invention defined by the claim.” *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). The effect of the preamble language can only be determined by reviewing the entirety of the appellants’ disclosure to gain an understanding of what the appellants actually invented and intended to encompass by the claim. *See Corning Glass Works v. Sumitomo Elect. U.S.A., Inc.*, 868 F.2d 1251, 1257, 9 USPQ2d 1962, 1966 (Fed. Cir. 1989).

Here, the specification makes clear that appellants' invention is directed to "an improvement in ... [zeolite catalysts useful for the production of methylamines] whereby they are blended with one or more microparticulate binders during formation, which renders the catalyst particles attrition resistant and therefore suitable for use in fluidized bed reactor processes" (page 1, lines 13-17). Moreover, "for a catalyst to be considered attrition resistant, the attrition ratio (AR)<sup>2</sup> should be less than or equal to about 3" (specification, page 15, lines 12-14). Thus, in this case, the words "attrition resistant," as specifically defined in the specification, are essential to point out the invention defined by the claims, i.e., they breathe life and meaning to the claims. Therefore, in this case, the preamble does limit the scope of the claims to a process for producing a defined "attrition resistant" catalyst composition. Thus, it follows that the examiner has failed to address all of the claim limitations. In short, the examiner has not pointed out and we do not find where Bergna, Abrams, Beck or THE CONDENSED CHEMICAL DICTIONARY disclose or suggest a process of producing a catalyst having an attrition ratio less than

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<sup>2</sup>As set forth in the paragraph bridging pages 14-15 of the specification,

Attrition measurements are performed using an attrition mill which simulates particle attrition near the gas spargers of a fluidized bed. A catalyst charge is loaded into a column fitted with a single 0.016" perforation. Air flows through the perforation, fluidizes the catalyst bed, and causes attrition. For most measurements, the constant air flow through the mill is calibrated to yield a linear velocity of 760 ft/s through the orifice; this compares to a typical velocity of 150 ft/s in a commercial fuel spargers. The attrition mill measurement accelerates attrition by a factor of roughly thirty. A 24 hour attrition measurement is a reliable indicator of attrition in a commercial reactor. Attrited fines (i.e., those particles lower than 20 micrometers in diameter) are collected in an overhead flask which is fitted with a porous thimble. Flask weight, recorded as a function of time, is used to calculate attrition. The determination of attrition is calculated as an attrition ratio, AR: catalyst attrition divided by the attrition rate of a fluid cracking catalyst standard (FCC). The FCC standard is supplied by Davison Chemical, Baltimore Maryland (SMR-5-5209-0293).

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or equal to 3, i.e., is “attrition resistant” as explicitly defined in the specification. Moreover, we do not find the examiner’s reliance on *In re Durden*, 763 F.2d 1046, 226 USPQ 359 (answer, page 7) well founded for reasons fully explained in, for example, *In re Brouwer*, 77 F.3d 422, 37 USPQ2d 1663 (Fed. Cir. 1996) and *In re Ochiai*, 71 F.3d 1565, 37 USPQ2d 1127 (Fed. Cir. 1995).

Secondly, viewing the invention as a whole, we find that neither Bergna, Abrams, Beck nor THE CONDENSED CHEMICAL DICTIONARY provide sufficient guidance or direction to enable one of ordinary skill in the art to select the particular combination of rho and/or chabazite acidic zeolites with only certain specific particulate binders to provide a catalyst composition having an attrition ratio less than or equal to 3 as defined in the specification, i.e., an “attrition resistant” catalyst composition, with a reasonable expectation of success. *In re O’Farrell*, 853 F.2d 894, 904, 7 USPQ2d 1673, 1681 (Fed. Cir.1988).

Therefore, we conclude that the examiner has not established a *prima facie* case of obviousness as to claims 7-11 and 14 which all require a process for production of an “attrition resistant” catalyst composition, i.e., a catalyst composition having an attrition ratio less than or equal to 3 as defined by the specification.

Having concluded that the examiner has not established a *prima facie* case of obviousness, we do not reach the rebuttal evidence of unexpected results discussed on pages 10-12 of the brief.

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*CONCLUSION*

To summarize, the decision of the examiner (I) to reject claims 7, 8, 11 and 14 under 35 U.S.C. § 103 as being unpatentable over Bergna in view of Abrams or Beck is **reversed** and (II) to reject claims 9 and 10 under 35 U.S.C. § 103 as being unpatentable over Bergna in view of

Abrams or Beck as applied to claims 7, 8, 11 and 14, and further in view of THE CHEMICAL CONDENSED DICTIONARY is **reversed**.

**REVERSED**

SHERMAN D. WINTERS )  
Administrative Patent Judge )  
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BRADLEY R. GARRIS  
Administrative Patent Judge

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