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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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 33

UNITED STATES BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte V. N. M. RAO

Appeal No. 1997-1820
Application No. 08/313,941¹

ON BRIEF

Before McKELVEY, Senior Administrative Patent Judge, and
SCHAFER and GARDNER-LANE, Administrative Patent Judges.

GARDNER-LANE, Administrative Patent Judge.

DECISION ON APPEAL

Applicant seeks review under 35 U.S.C. § 134 of the
examiner's final rejection of claims 1-13, 17-21, 23, and 24.
We REVERSE.

BACKGROUND

The claimed invention is directed toward a process for
the catalytic hydrogenolysis of certain fluorohalohydrocarbon
or fluorohalocarbon compounds using a metal on a carbon

¹ Application for patent filed 27 September 1994.

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support as a catalyst. The catalyst is characterized as containing less than about 200 ppm of phosphorous and less than about 200 ppm sulfur. According to applicant, catalysts low in both phosphorus and sulfur have improved catalytic properties (Paper 1 (08/313,941 ('941) specification) at 13-14).

The catalysts are prepared by washing the carbon support with an acid which is said to remove phosphorus and sulfur so that the carbon has less than 200 ppm of each. Other inorganic constituents of the carbon such as potassium, sodium, and iron are also said to be removed by the acid wash so that the carbon has less than 100 ppm of these constituents (Paper 1 at 6-7).

Claim 1 is illustrative of the claimed process:

1. A process for the catalytic hydrogenolysis of a cyclic or acyclic compound having the formula $C_nH_mF_pX_q$ wherein n is an integer from 1 to 6,^[2] m is an integer from 0 to 12, p is an integer from 1 to 13, q is an integer from 1 to 13 and each X is independently selected from Cl and Br, provided that

² In the claims attached to Appellant's brief (APPENDIX I), claim 1 reads that "n is an integer from 1 to 5." The "5" appears to be a typographical error and should instead be "6" (see original claim 1 (Paper 1 at 15)).

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$m+p+q$ equals $2n+2$ when the compound is saturated and acyclic, equals $2n$ when the compound is saturated and cyclic or is olefinic and acyclic, and equals $2n-2$ when the compound is olefinic and cyclic, using a catalyst of at least one metal selected from the group consisting of rhenium, cobalt, nickel, ruthenium, rhodium, palladium, osmium, iridium and platinum supported on carbon which is characterized by said catalyst containing less than about 200 ppm phosphorus and less than about 200 ppm sulfur.

Applicant presents a second independent claim that requires an acid washing step. Claim 24 is reproduced below:

24. A process for the catalytic hydrogenolysis of a cyclic or acyclic compound having the formula $C_nH_mF_pX_q$ wherein n is an integer from 1 to 6, m is an integer from 0 to 12, p is an integer from 1 to 13, q is an integer from 1 to 13 and each X is independently selected from Cl and Br, provided that $m+p+q$ equals $2n+2$ when the compound is saturated and acyclic, equals $2n$ when the compound is saturated and cyclic or is olefinic and acyclic, and equals $2n-2$ when the compound is olefinic and cyclic, using a catalyst of at least one metal selected from the group consisting of rhenium, cobalt, nickel, ruthenium, rhodium, palladium, osmium, iridium and platinum supported on carbon characterized by: (1) treating the carbon with acid; and (2) subsequently

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depositing said metal thereon; said treatment of the carbon with acid being such that after said deposit of metal, the catalyst employed for said hydrogenolysis contains between .1 and 10 percent by weight of said metal, less than about 200 ppm phosphorus and less than about 200 ppm sulfur.

From the language of the claims it is unclear whether the catalyst is the metal itself which is then placed on a carbon support or whether the catalyst is the combination of the metal and the carbon support. Since it is clear from applicant's disclosure that inorganic constituents such as sulfur and phosphorus are removed from the carbon support and not the metal (see, e.g., Paper 1 at 6-8), we interpret the "catalyst" referred to in the claims as including both the metal and the carbon support.

Applicant states that claims 1-5 and 9-13 stand or fall together (Paper 31 (App. Br.) at 10-11). Applicant's arguments address the limitations of each of the remaining claims separately.

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Discussion

The 35 USC § 112, first paragraph, rejection

The examiner rejects claims 18, 19, 21, 22, and 23 under 35 USC § 112, first paragraph. According to the examiner the claims limiting the metal of the catalyst to either nickel (claim 21), rhenium (claims 18, 22, and 23) or ruthenium (claim 19) are not supported by the specification because the only species of metal disclosed is palladium (Paper 32 (Ex. Ans) at 7).

The '941 disclosure describes the catalyst of the invention as containing "at least one metal selected from the group consisting of rhenium, cobalt, nickel, ruthenium, rhodium, palladium, osmium, iridium, and platinum" (Paper 1 at 3: 19-22). The examples of catalysts presented in the '941 disclosure all appear to be directed to catalysts that contain palladium (Paper 1 at 10-12).

The examiner argues that "a generic disclosure does not support a species from within the genus" especially "in the highly unpredictable area of catalysts." The examiner has provided no objective evidence that a metal other than palladium would not be expected to work as a catalyst in the claimed process. The examiner has pointed to no objective

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support for the unpredictability of the catalysts required by the claims.

"When rejecting a claim under the enablement requirement of section 112, the PTO bears an initial burden of setting forth a reasonable explanation as to why it believes that the scope of protection provided by that claim is not adequately enabled by the description of the invention provided in the specification of the application; this includes, of course, providing sufficient reasons for doubting any assertions in the specification as to the scope of enablement." In re Wright, 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993).

The specification need not contain an example if the invention is otherwise disclosed in such a manner that one skilled in the art will be able to practice it without an undue amount of experimentation. In re Borkowski, 422 F.2d 904, 908, 164 USPQ 642, 645(CCPA 1970).

The examiner has provided not established an objective reason why one skilled in the art would have to engage in undue experimentation to practice the claimed invention with any of the claimed and disclosed metals. The examiner has not established that the art involved in applicant's invention is

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unpredictable such that applicant's disclosure would need to provide an example of each catalyst claimed in order to be enabling. Accordingly, the examiner's rejection under 35 USC § 112, first paragraph, is REVERSED.

The 35 USC § 103 rejections

The examiner rejects claims 1-13, 17-20, and 24 under 35 USC § 103 as having been obvious over Miller et al. (Miller)³, Richardson⁴, Goleva⁵, and Hassler⁶.

Miller teaches a process for the hydrogenation of fluorohalocarbons. Miller discloses that "(a) further important feature is the nature of the catalytic material employed and the compositions thereof. We find that the reaction is particularly well promoted by the use of a palladium on activated carbon catalyst" (Miller at 2:26-30). The examiner acknowledges that Miller does not teach a catalyst containing less than about 200 ppm phosphorous and

³ Canadian Patent 593,529, issued 1 March 1960.

⁴ Richardson, James T., Principles of Catalytic Development, Plenum Press, 205-207 (1989).

⁵ A.A. Goleva et al., Russian Journal of Physical Chemistry, 44(2), 290-291 (1970).

⁶ John W. Hassler, Activated Carbon, Chemical Publishing Company, Inc., 343-345 (1963).

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less than about 200 ppm sulfur (Paper 32 at 4). Miller does not appear to teach acid washing of the carbon support as required by claim 24.

Richardson teaches that catalysts may be poisoned by sulfur and phosphorus in certain forms. Richardson teaches that sulfide ions (SH_2) and phosphine ions (PH_3) are toxic to catalysts while sulfate ions (SO_4^{2-}) and phosphate ions (PO_4^{3-}) are not.

Goleva teaches acid washing of the carbon catalyst to increase its ability to catalyze a particular dehydrochlorination reaction. The examiner offers no evidence that hydrogenation reactions and dehydrochlorination reactions require similar catalytic conditions.

Hassler teaches that, generally, activated carbon contains sulfur in a concentration of "traces to over 2 percent" and phosphates in a concentration of "from zero to over 3 percent." Hassler states that "(l)ittle or no information is available on other phosphorous compounds that may be present in carbon" (Hassler at 344).

The examiner takes the position that, given the teachings of the prior art, it would have been obvious to wash the catalyst of Miller with acid. According to the examiner, such

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an acid wash would inherently produce a catalyst having the limitations on sulfur and phosphorus content required by the claimed invention since applicant also uses an acid wash (Paper 32 at 4-5).

Both Goleva and Hassler teach acid washing of carbon.

While Goleva teaches that acid washing improves the catalytic activity of carbon in a dehydrochlorination reaction, the examiner has provided no reason why one skilled in the art performing the Miller hydrogenation reaction would have looked to the Goleva dehydrochlorination reaction for an appropriate catalyst. Accordingly, Goleva would not have suggested acid washing the carbon support used in the Miller hydrogenation reaction.

Hassler teaches that acid washing carbon removes sodium sulfate, replacing it with sulfuric acid through an ion exchange reaction. Since sulfates are not toxic in reactions (Richardson at 206), Hassler would not have suggested that acid washing the carbon would decrease toxicity.

The examiner further states that "it is clear from Hassler that various impurities such as iron, sulfur, phosphorus and sodium are present in some commercial activated charcoals in only trace amounts" (Paper 32 at 5).

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Apparently, it is the examiner's position that one skilled in the art wishing to manufacture a carbon catalyst would be motivated to select one of the commercially available carbons having low concentrations of sulfur and phosphorus since Richardson teaches that certain sulfur and phosphorus ions are toxic in catalysts.

The examiner's position is well taken with respect to sulfur. From Richardson one skilled in the art would have known that it is advisable to avoid sulfur in general when producing a catalyst. Since one skilled in the art would also have known that low sulfur content carbons were commercially available (Hassler), it would have been obvious to one skilled in the art to select (or screen for) one of the commercially available carbons having a low sulfur content. While Richardson teaches that sulfide, and not sulfate, ions are toxic in catalysts, one skilled in the art would be motivated to select an available carbon having a low sulfur content generally to avoid any possibility of toxic levels of sulfide ions.

The same would be true for phosphorus since Richardson teaches that certain phosphorus ions are toxic to catalysts except that the examiner has not provided any teaching that a

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low phosphorus content carbon was commercially available at the time of the invention. While Hassler teaches that low or no phosphate content carbon was commercially available, it does not teach that low or no phosphorus content carbon was commercially available. Note that Richardson teaches that phosphate ions are not toxic in catalysts.

The prior art does not contain a suggestion to modify Miller by acid washing the carbon support portion of the catalyst. While one skilled in the art would have been motivated to select a low phosphorus content carbon for use in manufacturing a catalyst, the examiner has not provided sufficient evidence to show that low or no phosphorus content carbon was commercially available at the time of the invention.

Accordingly, the examiner's rejection of claims 1-13, 17-20, and 24 is REVERSED.

The examiner rejects claims 21 and 23 as being unpatentable over Miller, Richardson, Goleva, Hassler and

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"further in view of" Kellner et al (Kellner)⁷, Cheminal⁸, and Morikawa et al. (Morikawa)⁹.

According to the examiner, Kellner, Cheminal and Morikawa teach the use of rhenium, ruthenium, and nickel catalysts supported on carbon for use in hydrogenolysis reactions where chlorine is replaced with hydrogen. The examiner does not state that these references contain any teachings regarding the inorganic content of carbon in a catalyst. According to the examiner the references are cited because they would have suggested modifying the process of Miller by substituting rhenium, ruthenium, or nickel for the metal component of the Miller catalyst (Paper 32 at 6).

Both claim 21 (which depends on claim 1) and claim 23 require the catalyst of claim 1. Since the prior art cited by the examiner does not teach or suggest the claim 1 catalyst, the examiner's rejection of claims 21 and 23 is also REVERSED.

⁷ WO 90/08748, published 9 August 1990.

⁸ US Patent 5,053,564, issued 1 October 1991.

⁹ WO 90/08753, published 9 August 1990.

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REVERSED

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Richard E. Schafer) BOARD OF PATENT
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