The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JAMES T. MERRILL and JAMES R. BUTLER

Appeal No. 2004-2118
Application No. 09/329,502

ON BRIEF

Before KIMLIN, OWENS and KRATZ, Administrative Patent Judges.
KRATZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's refusal to allow claims 1-6, 8-13 and 18-20, as amended after final rejection. Claims 15-17 and 21, the only other claims that remain pending in this application, have been indicated as being allowable by the examiner.

BACKGROUND

Appellants' invention relates to a process for alkylation and transalkylation of polyalkylated aromatic compounds. As explained by appellants, typically an integrated process is

employed including “an initial alkylation of the aromatic substrate followed by an intermediate recovery operation and then transalkylation” (specification, page 2).

Appellants acknowledge that “[i]n both alkylation and transalkylation, whether conducted in the liquid phase or in the vapor phase, it is a conventional practice to employ catalysts in the reactors comprising shape-selective molecular sieves” that “. . . may be the same or different . . . .” Id. Also, appellants acknowledge that, while not universal, “it is often the practice to employ a relatively small to intermediate pore size molecular sieve such as ZSM-5, ZSM-11, or silicalite in the alkylation reactor and follow this with a molecular sieve having a somewhat larger pore size, such as zeolite-Y . . . .” (appellants’ specification, page 3, first full paragraph).

Appellants use a high porosity zeolite-Y molecular sieve[1] having a specified silica/alumina ratio, a specified pore size and a specified surface area as a catalyst in the transalkylation

[1] Appellants refer to a high porosity zeolite-Y as one that possesses a surface area less than 500 m^2/g (specification, page 9, lines 2-5). At page 15 of the specification, it is stated that “[t]he foregoing catalyst characteristics are for the zeolite-Y catalyst as it exists in the crystallite form.”

reaction zone and a molecular sieve catalyst having an average pore size less than the average pore size of the catalyst used in the transalkylation zone in an alkylation zone. An understanding of the invention can be derived from a reading of exemplary claim 1, which is reproduced below.

> 1. In the alkylation and transalkylation of polyalkylated aromatic compounds, a process comprising:
>
> (a) providing a transalkylation reaction zone containing a transalkylation catalyst comprising a high porosity zeolite-Y molecular sieve having a silica/alumina ratio within the range of 2-5, a pore size greater than 7 and up to about 8 Angstroms, and a surface area of no more than 500 m^2/g;
>
> (b) supplying a polyalkylated aromatic component comprising polyalkyl benzenes in which the predominant alkyl substituents contain from 2 to 4 carbon atoms to said transalkylation reaction zone;
>
> (c) supplying benzene to said transalkylation reaction zone;
>
> (d) operating said transalkylation reaction zone under temperature and pressure conditions to maintain said polyalkylated aromatic component in a liquid phase and effective to cause disproportionation of said polyalkylated aromatic component to arrive at a disproportionation product having a reduced polyalkyl benzene content and an enhanced mono-alkyl benzene content;
>
> (e) recovering said disproportionation product from said transalkylation zone;
>
> (f) supplying a feedstock containing benzene and a C_2-C_4 alkylating agent to an alkylation reaction zone containing a molecular sieve aromatic alkylation catalyst having an average pore size which is less than the average pore size of said high porosity zeolite-Y;
>
> (g) operating said alkylation reaction zone to produce an alkylated product comprising a mixture of mono-alkylated

and poly-alkylated aromatic components and benzene by said alkylating agent in the presence of said molecular sieve alkylation catalyst; and

(h) supplying the alkylation product from said alkylation reaction zone to an intermediate recovery zone for the separation and recovery of mono-alkylbenzene from the alkylation product and for the separation and recovery of a polyalkylated aromatic component, including dialkybenzene, and employing said polyalkylated aromatic component as at least a portion of the polyalkylated aromatic component supplied in subparagraph (b) of claim 1.

In addition to alleged admitted prior art, the following prior art references of record are relied upon by the examiner in rejecting the appealed claims:

West et al. (West)	5,324,877	Jun. 28, 1994
Butler (published European Patent Application)	0 467 007	Jan. 22, 1992

Claims 1-6, 8 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over West alternatively in view of admitted prior art as disclosed by appellants in their specification. Claims 10-13 and 18-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over West in view of admitted prior art as disclosed by appellants in their specification and Butler.[2]

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[2] See the supplemental answer and response to remand mailed Dec. 05, 2003.

Rather than reiterating the conflicting viewpoints advanced by the examiner and appellants regarding the above-noted rejections, we make reference to the examiner's answers and final rejection and to appellants' briefs for a complete exposition thereof.

OPINION

We have reviewed appellants' arguments for patentability. However, we find ourselves in agreement with the examiner's determination that the applied prior art renders the claimed subject matter unpatentable under the provisions of 35 U.S.C. § 103(a). Moreover, we generally agree with the examiner's rebuttal of appellants' arguments with respect to the § 103(a) rejections as set forth in the answers. We offer the following for emphasis and completeness.

§ 103(a) Rejection of Claims 1-6, 8 and 9

According to appellants (brief, page 4), all of the claims do not stand or fall together. Regarding this rejection, separate arguments are presented by appellants only for claims 2

and 3 together as a group (brief, page 10). Consequently, claims 1, 4-6, 8 and 9 stand or fall together and we select claim 1 as a representative claim for that grouping of claims.

Appellants do not particularly argue that the claimed process patentably differs from the teachings of the applied references other than by way of the catalysts employed. Hence, appellants' principal arguments with the examiner's obviousness position center on the catalysts for the alkylation and transalkylation zones as called for in representative claim 1.

Appellants contend that the transalkylation zone catalyst as required by representative claim 1 is not suggested by the allegedly broad disclosure of West notwithstanding the fact that West discloses overlapping silica/alumina ratios, overlapping pore sizes and overlapping surface areas for molecular sieves that are disclosed in West as useful transalkylation catalyst materials. According to appellants, this is especially so since the surface areas reported for the molecular sieves by West are for an unhydrated catalyst precursor.[3]

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[3] The catalyst precursor can be subsequently hydrated to produce a hydrated catalyst that is used in the transalkylation reaction, which hydrated catalyst allegedly would have a higher surface area than the unhydrated precursor. See, e.g., column 9,

(continued...)

We do not find those arguments persuasive of the patentability of the claimed process over the applied prior art. As explained by the examiner (supplemental answer, pages 5-8), West discloses the selection of a molecular sieve catalyst for the transalkylation zone that preferably has a pore size greater than 7.0 angstroms and can have a surface area of at least 350 m^2/g, and which catalyst possesses a silica to alumina ratio of 4.5 to 35, all values that overlap the claimed ranges for those values. See column 3, line 34 through column 4, line 10 and column 5, line 54 through column 6, line 46 of West. Where, as here, a claimed range overlaps or touches a prior art range, the claimed invention is reasonably found to be prima facie obvious. In re Geisler, 116 F.3d 1465, 1469, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997). This is so since one of ordinary skill in the art, in following the teachings of the prior art, would be expected to arrive at a catalyst having the claimed attributes given the substantial overlap.

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[3](...continued)
lines 11-21 of West wherein a separate “hydration step” is described as being optional.

While appellants assert that the hydrated molecular sieve of West would be expected to have a higher surface area than an unhydrated molecular sieve, appellants have not substantiated, on this record, that the hydration as called for by West would result in a catalyst having a surface area outside of appellants' claimed range. In this regard, we note that the calculations furnished by appellants' counsel in the briefs (brief, pages 7-9, reply brief, page 2 and the supplemental reply brief) are merely arguments of counsel, not evidence that has been substantiated with actual surface area measurements.[4] Moreover, West teaches at column 9, lines 16-21 that hydration is merely an option. Consequently, the minimum amount of water to be added to hydrate the molecular sieve so as to contain 3.5 weight percent water (West, column 7, lines 52-55) could be zero weight percent water when the calcination results in leaving 3.5 weight percent water in the catalyst. Even in the case of Example 1, the amount of added water to reach the preferred 3.5 weight percent minimum

[4] While we agree with appellants that appellants' specification supports the argued inverse relationship between porosity and surface area, that relationship alone does not substantiate the attorney provided surface area calculations as being representative of the disclosure of West.

hydration level is enough water to increase the water content of the sieve by 0.5%,[5] not 5 weight percent added as appellants' calculations at page 9 of the brief seemingly assume as being required. Additionally, appellants' arguments with respect to the effect of hydration on surface area appear to be undercut by the disclosure in appellants' specification at page 15, lines 1 and 2. That last mentioned disclosure in appellants' specification suggests that appellants' claimed catalyst characteristics that are under consideration here, including the surface area, are also based on measurements made on a catalyst precursor ("zeolite-Y catalyst as it exists in the crystallite form"). Accordingly, we agree with the examiner that West reasonably suggests the use of a transalkylation catalyst as herein claimed.

With respect to the claim requirement that the alkylation catalyst has a lesser average pore size than the transalkylation catalyst, we agree with the examiner that it would have been obvious to modify the alkylation/transalkylation process of West

[5] Example 1 of West suggests an unhydrated or dry molecular sieve catalyst may have a water content of about 3 weight percent.

by employing a molecular sieve having such a lesser average pore size in the alkylation zone based on such a provision having been conventional in alkylation/transalkylation processes as admitted by appellants at page 3, lines 9-14 of the specification.

Appellants argue (brief, page 10), in effect, that the admission in the specification is an admission with respect to zeolite-Y, <u>not</u> high porosity zeolite-Y. That argument is not persuasive. One of ordinary skill in the art at the time of the invention would have reasonably determined upon routine experimentation that the admitted conventional use of a lower average pore size for the alkylation zone sieve would have been applicable whether the transalkylation zone catalyst was a “high porosity” zeolite-Y or a zeolite-Y. This is so for substantially the same reasons that type of porosity difference in catalysts is used when the transalkylation catalyst is a zeolite-Y catalyst. We note that both zeolite-y and “high porosity” zeolite-Y catalysts are encompassed by West and appellants have not articulated a compelling rationale as to why use of a “high porosity” zeolite-Y in the transalkylation zone as taught by West would lead one of ordinary skill in the art away from following

that conventional porosity difference practice in selecting the alkylation zone catalyst.

Unlike appellants (brief, page 10), we do not find that West teaches that the same catalyst must “be employed” in both the alkylation and transalkylation zones. Rather, West suggests that molecular sieve catalysts according to the invention (that is, hydrated molecular sieves) may be used in both zones. See, e.g., column 10, lines 19-22. Such catalysts need not be the same for each zone. Indeed, West (column 3, lines 34+) describes a variety of sieves that may be hydrated, including catalysts that include silicalite and other materials as admitted by appellants at page 3 of the specification to be conventional, for use in the alkylation zone. In light of the above and for the reasons set forth in the answers, we do not find appellants’ arguments persuasive of any reversible error in the examiner’s obviousness position as to representative claim 1.

Regarding claims 2 and 3, appellants also argue (brief, page 10) that the narrower zeolite surface areas called for in those claims would be impossible to obtain given the hydration of West. However, for the reasons set forth above, appellants simply have not established, on this record, that the hydration

step of West would be an actual impediment to the obtention of a zeolite surface area as herein claimed especially given the minimum levels of hydration encompassed by the disclosure of West.

Consequently, we agree with the examiner that West, taken with or without the admissions in the specification, renders the subject matter of claims 1-6, 8 and 9 obvious within the meaning of 35 U.S.C. § 103(a).

§ 103(a) Rejections of Claims 10-13 and 18-20

Appellants have not furnished separate arguments for this grouping of claims in the brief with the exception of claim 20.[6] Consequently, we select claim 10 as a representative claim for this ground of rejection with respect to claims 10-13, 18 and 19.

We do not find appellants' arguments with respect to a difference in the catalyst employed persuasive of unobviousness of the subject matter of claims 10-13, 18 and 19 for the same reasons advanced above with respect to our discussion of the

[6] While appellants refer to claim 19 at page 13 of the brief, claim 20 was obviously intended since claim 20 specifies a surface area as discussed by appellants, not claim 19.

examiner's § 103(a) rejection of claims 1, 4-6, 8 and 9 and further in view of the reasons set forth in the examiner's answers. Appellants additionally argue (brief, pages 11-13) that Butler and West are not combinable since West requires the same catalyst in both reactors. However, as also explained above, appellants simply have not established that West is so limited in terms of catalyst selection. We note that Butler teaches that the use of a liquid or gas phase in the alkylation zone are alternatives at least for certain feedstocks and alkylating agents. See, e.g., page 2, lines 10-12, page 3, lines 37-46 and page 4, lines 33-37 of Butler. Moreover, Butler teaches that the same or different catalysts may be employed in the separate alkylation and transalkylation zones. See, e.g., page 2, lines 39-42, and page 3, line 55 through page 4, line 7 of Butler.

With regard to appellants' apparent reference to the subject matter of claim 20 at page 13 of the brief, our disposition of that claim and appellants' separate comments relating thereto follows from our disposition of the subject matter of claim 3, as discussed above.

Under the circumstances recounted above, it is our determination that the evidence of record for and against a conclusion of obviousness, reconsidered in light of the respective arguments and evidence advanced by appellants and the examiner, on balance, weighs most heavily in favor of an obviousness conclusion with respect to the rejections under consideration. Accordingly, we shall sustain the examiner's rejections.

CONCLUSION

The decision of the examiner to reject claims 1-6, 8 and 9 under 35 U.S.C. § 103(a) as being unpatentable over West with or without admitted prior art as disclosed by appellants in their specification; and to reject claims 10-13 and 18-20 under 35 U.S.C. § 103(a) as being unpatentable over West in view of admitted prior art as disclosed by appellants in their specification and Butler is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

EDWARD C. KIMLIN Administrative Patent Judge	)	
TERRY J. OWENS Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
PETER F. KRATZ Administrative Patent Judge	)	

PFK/psb

FINA TECHNOLOGY INC
P.O. BOX 674412
HOUSTON, TX 77267-4412