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15/680,738	08/18/2017	Benjamin Bin Chen	IR3897CIP3	6547
31684	7590	02/28/2022	EXAMINER	
ARKEMA INC. 900 First Avenue Bldg 4-2 King of Prussia, PA 19406			BOYLE, KARA BRADY	
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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* BENJAMIN BIN CHEN, PHILIPPE BONNET,  
BRETT L. VAN HORN, and JOSEPH S. COSTA

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Appeal 2021-001752  
Application 15/680,738  
Technology Center 1700

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Before JEFFREY B. ROBERTSON, MERRELL C. CASHION, JR., and  
SHELDON M. MCGEE, *Administrative Patent Judges*.

ROBERTSON, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant appeals from the  
Examiner’s decision to reject claims 1–9.<sup>2</sup> Appeal Br. 3. We have  
jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

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<sup>1</sup> This Decision includes citations to the following documents:  
Specification filed August 18, 2017 (“Spec.”); Final Office Action entered  
May 21, 2020 (“Final Act.”); Appeal Brief filed October 9, 2020 (“Appeal  
Br.”); and Examiner’s Answer entered October 30, 2020 (“Ans.”).

<sup>2</sup> We use the term “Appellant” to refer to “applicant” as defined in  
37 C.F.R. § 1.42. Appellant identifies Arkema, Inc. as the real party in  
interest. Appeal Br. 2.

CLAIMED SUBJECT MATTER

Appellant states the invention relates to blowing agents for thermosetting foams. Spec. 1, 1. 15. Claim 1, the only independent claim on appeal, is reproduced below and is illustrative of the claimed subject matter (Appeal Br. 10, Claims App.):

1. A polyisocyanurate foam composition comprising a polymer blowing agent composition comprising a combination of the hydrochlorofluoroolefin HCFO-1233zd [1-chloro-3,3,3-trifluoropropene] and pentane wherein from about 20 to 60 wt% of said combination is the hydrochlorofluoroolefin HCFO-1233zd and from about 40 to 80 wt% is pentane and wherein more than about 70 wt% of said hydrochlorofluoroolefin HCFO-1233zd is the trans stereoisomer of hydrochlorofluoroolefin 1233zd.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Singh et al. ("Singh")	US 2004/0256594 A1	Dec. 23, 2004
Tanaka et al. ("Tanaka")	WO 2004/044084 A1 (citations to US 2006/0014843 A1, published Jan. 19, 2006)	May 27, 2004

### REJECTION<sup>3</sup>

The Examiner rejected claims 1–9 under 35 U.S.C. § 103 as being unpatentable over Singh and Tanaka.<sup>4</sup> Ans. 3–6; *see also* Final Act. 4; and Non-Final Act. 2–6 (Non-Final Office Action, entered January 14, 2019, hereinafter “Non-Final Act.”).

### OPINION

We confine our discussion to claim 1, which is representative of the separate arguments made by Appellant with respect to the rejection on appeal. 37 C.F.R. § 41.37(c)(1)(iv)(2013).

#### *The Examiner’s Rejection*

In rejecting claim 1 as unpatentable over Singh and Tanaka, the Examiner found Singh discloses blowing agent compositions for foams and foamable compositions including polyisocyanurate foams. Ans. 3. The Examiner found Singh discloses a formula that represents HCFO-1233zd (1-chloro-3,3,3-trifluoropropene) as a blowing agent and Singh discloses co-blowing agents as well as mixtures of blowing agents. *Id.* at 3–5. The Examiner found Singh does not disclose the blowing agent comprises pentane. *Id.* at 6.

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<sup>3</sup> The Examiner withdrew the rejection of claims 1–9 under 35 U.S.C. § 112, first paragraph in the Answer. Ans. 6–7; *see also* Final Act. 2–3.

<sup>4</sup> Although the Examiner indicates claims 19 and 20 are also subject to this rejection in the Examiner’s Answer, claims 19 and 20 were canceled in an Amendment and Response filed May 1, 2020.

The Examiner found Tanaka discloses polyisocyanurate foams that are formed using blowing agents, which include supplemental blowing agents such as pentane, HFC-365mfc (1,1,1,3,3-pentafluorobutane), and HFC-134a (1,1,1,2-tetrafluoroethane), where the latter two are examples of supplemental blowing agents disclosed in Singh. Ans. 6. As such, the Examiner found Tanaka discloses pentane, HFC-365mfc, and HFC-134a are equivalents and interchangeable, such that it would have been obvious to one of ordinary skill in the art to have substituted pentane for the HFC-365mfc and HFC-134a disclosed in Singh to arrive at the blowing agent composition recited in claim 1. *Id.*

#### *Appellant's Arguments*

Appellant argues the claimed blowing agent combination exhibits a synergistic effect in a slower loss of insulating efficiency as the foam ages, which is more than the expected linear relationship for the components individually, and that there would be no reasonable expectation of success from the cited prior art that such a synergistic effect could be obtained. Appeal Br. 5–6 (citing Declaration Under 37 C.F.R. § 1.132 of Dr. Benjamin Chen filed July 12, 2019, hereinafter the “Chen Declaration”); *see also* Appeal Br. 8–9. Appellant argues Singh discloses many additional compounds for blowing agents that do not include hydrocarbons such that it would not have been obvious to have employed the specific combination of HCFO-1233zd and pentane recited in claim 1. *Id.* at 7. Appellant contends that Tanaka does not disclose any olefinic blowing agents, such that it would not have been obvious to have selected one of the supplemental blowing agents disclosed therein as useful with non-olefinic materials to be used as

an additional component with tetrafluoropropene as disclosed in Singh. *Id.* at 7–8.

*Discussion*

We are not persuaded by Appellant’s arguments. As found by the Examiner, Singh discloses compounds that are used as blowing agents to polyisocyanurate foams, where the compositions include HCFO-1233zd (Formula II, where one R on terminal carbon is Cl and remaining Rs are H,  $n=0$  in R’, R in Y group is F). Singh ¶¶ 22–27, 68, 83. Singh expressly discloses that in producing polyisocyanurate foams, a mixture of blowing agents including co-blowing agents may be used. *Id.* ¶¶ 55–66, 68, 83. As the Examiner points out, Singh discloses examples of co-blowing agents that include HFC-134a and HFC-365mfc. *Id.* ¶¶ 59, 64.

Tanaka discloses supplemental foam blowing agents that include pentane (n-pentane, isopentane, cyclopentane) as well as HFC-365mfc and HFC134a. Tanaka ¶ 79. As a result of the overlapping disclosures for co-blowing agents in Singh and Tanaka, we agree with the Examiner’s position that it would have been obvious to have used pentane as a co-blowing agent in combination with HCFO-1233zd. That is, one of ordinary skill in the art would have understood that pentane would have been an obvious alternative for the co-blowing agents disclosed in Singh in light of Tanaka’s disclosure of using co-blowing agents for the same purpose in the production of similar foams.

In this regard, although Appellant argues that one of ordinary skill in the art would not have used the co-blowing agents in Tanaka, which are used in the absence of olefins, with the olefin-containing blowing agents disclosed in Singh, Appellant provides no evidence or support for this

statement. As such, we do not find Appellant's arguments persuasive. *In re Schulze*, 346 F.2d 600, 602 (CCPA 1965) ("Argument in the brief does not take the place of evidence in the record.").

We are also not persuaded by Appellant's contentions regarding the alleged synergistic effect produced as a result of combining HCFO-1233zd and pentane for the reasons expressed by the Examiner, which we adopt as our own. Ans. 7–13. In particular, we agree with and adopt the Examiner's position that the results presented in the Chen Declaration fail to establish a sufficient trend in the percentage thermal conductivity increase to support Appellant's allegations of an unexpected synergy.

We also agree with the Examiner's position that the results are not commensurate in scope with the claims. We observe, as does the Examiner, that the alleged synergistic trend of the thermal conductivity percentage increase of blends of HCFO-1233zd and pentane over 100% pentane over time "does not go up in the manner anticipated, on the contrary, it goes down slightly upon aging" (Chen Decl. ¶ 5) appears only to be true for certain months in two of the percentages of HCFO-1233zd tested (10% and 20%), one of which (10% HCFO-1233zd) is not within the recited range in claim 1 of 20% to 60% HCFO-1233zd. Chen Decl. ¶ 5 (only entries for 20% HCFO-1233zd in Months 2, 3, and 6, and 10% HCFO-1233zd for Months 2 and 4–6 exhibit a percentage increase that is lower than the percentage increase for 0% HCFO-1233zd (100% pentane) for the same months, as shown in Table B). Thus, even assuming that one of ordinary skill in the art would have expected a linear increase in thermal conductivity percentage increase over time in blends of HCFO-1233zd and pentane over pentane alone, the results presented in the Chen Declaration are not

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sufficient to support Appellant's position that a trend is established or is commensurate in scope with the claims.

Accordingly, we affirm the Examiner's rejection of claim 1, as well as dependent claims 2–9.

### DECISION SUMMARY

In summary:

<b>Claim(s) Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1–9	103	Singh, Tanaka	1–9	

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

**AFFIRMED**