

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

RIMFROST AS,
Petitioner,

v.

AKER BIOMARINE ANTARCTIC AS,
Patent Owner.

Case IPR2018-01179
Patent 9,375,453 B2

Before ERICA A. FRANKLIN, TINA E. HULSE, and
JOHN E. SCHNEIDER, *Administrative Patent Judges*.

FRANKLIN, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
35 U.S.C. § 314(a)

I. INTRODUCTION

Rimfrost AS (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 33–61 of U.S. Patent No. 9,375,453 B2 (Ex. 1001, “the ’453 patent”). Paper 2 (“Pet.”). Aker Biomarine Antarctic AS (“Patent Owner”) declined to file a Preliminary Response to the Petition.

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314(b); 37 C.F.R. § 42.4(a). Upon considering the Petition, we determine that Petitioner has shown a reasonable likelihood that it would prevail in showing the unpatentability of at least one challenged claim. Accordingly, we institute an *inter partes* review of all challenged claims based upon all grounds raised in the Petition.

A. *Related Proceedings*

Petitioner and Patent Owner provide notice that two related patents, U.S. Patent Nos. 9,028,877 B2 (“the ’877 patent”) and 9,078,905 B2 (“the ’905 patent”), have been asserted in *Aker Biomarine Antarctic AS v. Olympic Holding AS*, Case No. 1:16-CV-00035-LPS-CJB (D. Del.) (stayed). Pet. 2; Paper 4, 1. The parties note that the ’453 patent was asserted, along with related patents, in *In the Matter of Certain Krill Oil Products and Krill Meal for Production of Krill Oil Products*, Investigation No. 337-TA-1019 (USITC). *Id.* According to the parties, that matter has been “effectively terminated.” *Id.*

The Board has issued Final Written Decisions addressing challenges to claims of the ’877 patent (IPR2017-00746, Paper 23, claims 1–19 shown to be unpatentable; IPR2017-00748, Paper 23, claims 1–19 not shown to be unpatentable), and challenges to claims of the ’905 patent (IPR2017-00745,

Paper 24, claims 1–20 shown to be unpatentable; IPR2017-00747, Paper 24, claims 1–20 not shown to be unpatentable).

Petitioner has concurrently filed a petition for *inter partes* review of claims 1–32 of the '453 patent in IPR2018-01178.

B. The '453 Patent

The '453 patent describes extracts from Antarctic krill that include bioactive fatty acids. Ex. 1001, 1:19–20. The Specification states that the patent “discloses novel krill oil compositions having characterized by containing high levels of astaxanthin, phospholipids, includ[ing] enriched quantities of ether phospholipids, and omega-3 fatty acids.” *Id.* at 9:28–31.

The '453 patent explains that “[k]rill oil compositions have been described as being effective for decreasing cholesterol, inhibiting platelet adhesion, inhibiting artery plaque formation, preventing hypertension, controlling arthritis symptoms, preventing skin cancer, enhancing transdermal transport, reducing the symptoms of premenstrual symptoms or controlling blood glucose levels in a patient.” Ex. 1001, 1:46–52. In addition, the '453 patent recognizes that krill oil compositions, including compositions having up to 60% w/w phospholipid content and as much as 35% w/w EPA/DHA content, were known in the art prior to the time of invention. *Id.* at 1:52–57. The '453 patent also indicates that supercritical fluid extraction with solvent modifier was known to be a useful method for extracting marine phospholipids from salmon roe. *Id.* at 1:65–67.

According to the '453 patent, the solvent extraction methods used in the prior art to isolate krill oil from the krill “rely on the processing of frozen krill that are transported from the Southern Ocean to the processing site,” which transportation is expensive and may result in the degradation of the

krill starting material. *Id.* at 2:3–6. Such methods have included steps of placing the material into a ketone solvent, such as acetone, to extract the lipid soluble fraction, and recovering the soluble lipid fraction from the solid contents using a solvent such as ethanol. *Id.* at 1:32–40. To overcome the above limitations, the '453 patent discloses “methods for processing freshly caught krill at the site of capture and preferably on board a ship.” *Id.* at 10:18–20. The challenged claims do not recite any limitations directed toward processing the krill at the site of capture.

The '453 patent describes producing krill oil by first subjecting the krill to a protein denaturation step to avoid the formation of enzymatically decomposed oil constituents. *Id.* at 9:43–50. The Specification explains that the invention is “not limited to any particular method of protein denaturation. In some embodiments, the denaturation is accomplished by application of chemicals, heat, or combinations thereof.” *Id.* at 10:26–31. The Specification describes an embodiment wherein the krill oil is subsequently extracted using, e.g., a polar solvent and use of supercritical carbon dioxide. *Id.* at 9:51–54.

In Example 7 of the '453 patent, “[k]rill lipids were extracted from krill meal (a food grade powder) using supercritical fluid extraction with co-solvent.” *Id.* at 31:45–46.

Initially, 300 bar pressure, 333°K and 5% ethanol (ethanol:CO₂, w/w) were utilized for 60 minutes in order to remove neutral lipids and astaxanthin from the krill meal. Next, the ethanol content was increased to 23% and the extraction was maintained for 3 hours and 40 minutes. The extract was then evaporated using a falling film evaporator and the resulting krill oil was finally filtered.

Id. at 31:47–53.

Example 8 of the '453 patent prepared krill oil using the same method described in Example 7, from the same krill meal used in that example. Ex. 1001, 32:16–17. The krill oil was then analyzed using ³¹P NMR analysis to identify and quantify the phospholipids in the oil. *Id.* at 32:17–19. Table 22¹ shows the phospholipid profiles for the raw material, the final product, and a commercially available krill oil, Neptune Krill Oil (“NKO”). *Id.* at 32:44–47. Table 22 is reproduced below:

TABLE 22

Phospholipid profiles

	Type B krill powder	NKO	Krill Oil obtained in Example 7
PC	66.0	68.6	75.3
AAPC	12.0	7.0	13.0
PI			
1LPC	1.2	1.3	0.4
PS			
2LPC	7.4	13.8	2.9
LAAPC	2.2	1.2	0.9
PE	6.0	3.4	3.4
AAPE			1.5
SM			
GPC		1.3	
DHSM			
NAPE		3.4	
CL	5.3		2.1
LPE			0.5
LCL			
% PL in powder or lipid sample	8.3	30.0	47.9

Id. at 32:15–39.

The '453 patent teaches that the “main polar ether lipids of the krill meal are alkylacylphosphatidylcholine (AAPC) at 7–9% of total polar lipids,

¹ A reference in Example 8 of the '453 patent to “table 25” (Ex. 1001, 32:45) appears to be a typographical error, as the Specification does not include a Table 25. We understand that reference to “table 25” to instead mean “Table 22,” which sets forth the relevant phospholipid profiles.

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