

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference IR3949PCT	<b>FOR FURTHER ACTION</b>		See item 4 below
International application No. PCT/US2009/043538	International filing date ( <i>day/month/year</i> ) 12 May 2009 (12.05.2009)	Priority date ( <i>day/month/year</i> ) 12 May 2008 (12.05.2008)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant ARKEMA INC.			

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input checked="" type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No. +41 22 338 82 70	Date of issuance of this report 17 November 2010 (17.11.2010)
	Authorized officer  <p align="center"><b>Athina Nickitas-Etienne</b></p> e-mail: pt04.pct@wipo.int

## PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

# PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:  
STEVEN D. BOYD  
ARKEMA INC.  
2000 MARKET STREET  
PHILADELPHIA, PA 19103

Date of mailing  
(day/month/year)

**11 AUG 2009**

Applicant's or agent's file reference  
IR3949PCT

**FOR FURTHER ACTION**

See paragraph 2 below

International application No.

PCT/US 09/43538

International filing date (day/month/year)

12 May 2009 (12.05.2009)

Priority date (day/month/year)

12 May 2008 (12.05.2008)

International Patent Classification (IPC) or both national classification and IPC  
IPC(8) - C07C 19/10 (2009.01)  
USPC - 570/164; 510/407; 252/67

Applicant ARKEMA INC.

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US  
Mail Stop PCT, Attn: ISA/US  
Commissioner for Patents  
P.O. Box 1450, Alexandria, Virginia 22313-1450  
Facsimile No. 571-273-3201

Date of completion of this opinion

28 July 2009 (28.07.2009),

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300  
PCT OSP: 571-272-7774

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 09/43538

## Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:
- the international application in the language in which it was filed.
- a translation of the international application into \_\_\_\_\_ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2.  This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:
- a. type of material
- a sequence listing
- table(s) related to the sequence listing
- b. format of material
- on paper
- in electronic form
- c. time of filing/furnishing
- contained in the international application as filed
- filed together with the international application in electronic form
- furnished subsequently to this Authority for the purposes of search
4.  In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 09/43538

**Box No. IV Lack of unity of invention**

1.  In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
- paid additional fees
  - paid additional fees under protest and, where applicable, the protest fee
  - paid additional fees under protest but the applicable protest fee was not paid
  - not paid additional fees

2.  This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

complied with

not complied with for the following reasons:

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: claims 1-8, 15-28 directed to a solvent/cleaner and the use of a solvent/cleaner comprising about 70% or more of the trans stereoisomer of hydrochlorofluoroolefin 1233zd.

Group II: claims 9-14, 29-34 directed to a heat transfer fluid and the use of a heat transfer fluid comprising about 70% or more of the trans stereoisomer of hydrochlorofluoroolefin 1233zd.

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because under PCT Rule 13.2 they lack the same or corresponding technical features for the following reasons:

Group II does not include the solvent/cleaner of Group I.  
Group I does not include the heat transfer fluid of Group II.

The common feature of about 70% or more of the trans stereoisomer of hydrochlorofluoroolefin 1233zd of Groups I and II are taught by US 2005/0033097 A1 to Tung et al. (para [0005]); therefore the common feature is not an improvement over the prior art.

Applicant has elected to pay for 2 claim groups. This case is a paid lack of unity.

4. Consequently, this opinion has been established in respect of the following parts of the international application:

all parts

the parts relating to claims Nos. \_\_\_\_\_

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 09/43538

**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**I. Statement**

Novelty (N)	Claims	2-3, 6-8, 10-11, 14, 16-17, 20, 24-28, 30-31 and 34	YES
	Claims	1, 4-5, 9, 12-13, 15, 18-19, 21-23, 29 and 32-33	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-34	NO
Industrial applicability (IA)	Claims	1-34	YES
	Claims	NONE	NO

**2. Citations and explanations:**

Claims 1, 4-5, 9, 12-13, 15, 18-19, 21-23, 29 and 32-33 lack novelty under PCT Article 33(2) as being anticipated by US 2006/0142173 A1 to Johnson et al. (hereinafter Johnson).

Regarding claim 1, Johnson discloses a solvent/cleaner composition (para [0002]; para [0024] - para [0028]) comprising at least about 70% by weight (para [0031]) of the trans stereoisomer of hydrochlorofluoroolefin 1233zd (para [0013]; Markush structure - para [0014] - para [0017]; para [0026] - "1-chloro-3,3,3-trifluoro-1-propene").

Regarding claim 4, Johnson discloses the solvent/cleaner composition of claim 1, as above, further comprising ethers, esters, ketones and alcohols (para [0027]).

Regarding claim 5, Johnson discloses the solvent/cleaner composition of claim 4, as above, where the alcohol is selected from the group consisting of methanol, ethanol and isopropanol (para [0027]).

Regarding claim 9, Johnson discloses a heat transfer fluid composition (para [0002]; para [0030] - para [0033]) comprising at least about 70% by weight (para [0031]) of the trans stereoisomer of hydrochlorofluoroolefin 1233zd (para [0013]; Markush structure - para [0014] - para [0017]).

Regarding claim 12, Johnson discloses the heat transfer fluid composition of claim 9, as above, further comprising ethers, esters, ketones and alcohols (para [0027]).

Regarding claim 13, Johnson discloses the heat transfer fluid of claim 12, as above, where the alcohol is selected from the group consisting of methanol, ethanol and isopropanol (para [0027]).

Regarding claim 15, Johnson discloses a method of removing contaminants from a surface comprising contact the surface with a liquid and/or vapor (para [0040] - para [0044]) comprising at least about 70% by weight (para [0031]) of the trans stereoisomer of hydrochlorofluoroolefin 1233zd (para [0013]; Markush structure - para [0014] - para [0017]).

Regarding claim 18, Johnson discloses the method of claim 15, as above, where the liquid and/or vapor further comprises ethers, esters, ketones and alcohols (para [0027]).

Regarding claim 19, Johnson discloses the method of claim 15, as above, where the alcohol is selected from the group consisting of methanol, ethanol and isopropanol (para [0027]).

Regarding claim 21, Johnson discloses the method of claim 15, as above, comprising degreasing (para [0010]; para [0039]; para [0041] - para [0042]), precision cleaning (para [0010]), or defluxing (para [0005]).

Regarding claim 22, Johnson discloses the method of claim 15, as above, comprising degreasing (para [0010]; para [0039]; para [0041] - para [0042]).

Regarding claim 23, Johnson discloses the method of claim 15, as above, comprising precision cleaning (para [0010]) and defluxing (para [0005]).

Regarding claim 29, Johnson discloses a process for producing refrigeration comprising compressing a refrigerant in a compressor, and evaporating the refrigerant in the vicinity of a body to be cooled (para [0031]; para [0039]; para [0048] - para [0049]), where the refrigerant comprises at least about 70% by weight (para [0031]) of the trans stereoisomer of hydrochlorofluoroolefin 1233zd (para [0013]; Markush structure - para [0014] - para [0017]).

Regarding claim 32, Johnson discloses the process of claim 29, as above, where the refrigerant further comprises ethers, esters, ketones and alcohols (para [0027]).

Regarding claim 33, Johnson discloses the process of claim 32, as above, where the alcohol is selected from the group consisting of methanol, ethanol and isopropanol (para [0027]).

-- see supplemental box --

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 09/43538

## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

-- Box No. V(2) -- Citations and explanations:

Claims 2-3, 6-8, 10-11, 14, 16-17, 20, 25, 27-28, 30-31 and 34 lack an inventive step under PCT Article 33(3) as being obvious over Johnson.

Regarding claim 2, Johnson discloses the solvent/cleaner composition of claim 1, as above, where the hydrochlorofluoroolefin 1233zd (para [0013]; Markush structure - para [0014] - para [0017]) comprises at least about 70% by weight (para [0031]) of the trans stereoisomer. Johnson does not expressly disclose where the hydrochlorofluoroolefin comprises about 90 wt% or more of the trans stereoisomer. The wt% of the trans stereoisomer would have been determined through routine experimentation by one of ordinary skill in the art.

Regarding claim 3, Johnson discloses the solvent/cleaner composition of claim 1, as above, where the hydrochlorofluoroolefin 1233zd (para [0013]; Markush structure - para [0014] - para [0017]) comprises at least about 70% by weight (para [0031]) of the trans stereoisomer. Johnson does not expressly disclose where the hydrochlorofluoroolefin comprises about 97 wt% or more of the trans stereoisomer. The wt% of the trans stereoisomer would have been determined through routine experimentation by one of ordinary skill in the art.

Regarding claim 6, Johnson discloses the solvent/cleaner composition of claim 4, as above, further comprising esters (para [0027]). Johnson does not expressly disclose particular species of ester co-solvents such as methyl formate, methyl acetate, ethyl formate and ethyl acetate. The particular species of ester co-solvents utilized would have been encompassed within the knowledge level of, or determined through undue experimentation by, one of ordinary skill in the art.

Regarding claims 7-8, Johnson discloses the solvent/cleaner composition of claim 1, as above. Johnson does not expressly disclose where such a solvent/cleaner composition has a Kauri-butanol value in a particular range. This would have been determined through routine experimentation by one of ordinary skill in the art.

Regarding claim 10, Johnson discloses the heat transfer fluid composition of claim 9, as above, where the hydrochlorofluoroolefin 1233zd (para [0013]; Markush structure - para [0014] - para [0017]) comprises at least about 70% by weight (para [0031]) of the trans stereoisomer. Johnson does not expressly disclose where the hydrochlorofluoroolefin comprises about 90 wt% or more of the trans stereoisomer. The wt% of the trans stereoisomer would have been determined through routine experimentation by one of ordinary skill in the art.

Regarding claim 11, Johnson discloses the heat transfer fluid composition of claim 9, as above, where the hydrochlorofluoroolefin 1233zd (para [0013]; Markush structure - para [0014] - para [0017]) comprises at least about 70% by weight (para [0031]) of the trans stereoisomer. Johnson does not expressly disclose where the hydrochlorofluoroolefin comprises about 97 wt% or more of the trans stereoisomer. The wt% of the trans stereoisomer would have been determined through routine experimentation by one of ordinary skill in the art.

Regarding claim 14, Johnson discloses the heat transfer fluid of claim 12, as above, further comprising esters (para [0027]). Johnson does not expressly disclose particular species of ester co-solvents such as methyl formate, methyl acetate, ethyl formate and ethyl acetate. The particular species of ester co-solvents utilized would have been encompassed within the knowledge level of, or determined through undue experimentation by, one of ordinary skill in the art.

Regarding claim 16, Johnson discloses the method of claim 15, as above, where the liquid and/or vapor comprises at least about 70% by weight (para [0031]) of the trans stereoisomer (para [0013]; Markush structure - para [0014] - para [0017]). Johnson does not expressly disclose where the liquid and/or vapor comprises about 90 wt% or more of the trans stereoisomer. The wt% of the trans stereoisomer would have been determined through routine experimentation by one of ordinary skill in the art.

Regarding claim 17, Johnson discloses the method of claim 15, as above, where the liquid and/or vapor comprises at least about 70% by weight (para [0031]) of the trans stereoisomer (para [0013]; Markush structure - para [0014] - para [0017]). Johnson does not expressly disclose where the liquid and/or vapor comprises about 97 wt% or more of the trans stereoisomer. The wt% of the trans stereoisomer would have been determined through routine experimentation by one of ordinary skill in the art.

Regarding claim 20, Johnson discloses the method of claim 15, as above, further comprising esters (para [0027]). Johnson does not expressly disclose particular species of ester co-solvents such as methyl formate, methyl acetate, ethyl formate and ethyl acetate. The particular species of ester co-solvents utilized would have been encompassed within the knowledge level of, or determined through undue experimentation by, one of ordinary skill in the art.

Regarding claim 25, Johnson discloses the method of claim 15, as above, comprising carrier fluid applications for lubricants and sprayable compositions for surface treatment applications (para [0010]). Johnson does not expressly disclose carrier fluid applications for spray adhesive. Any particular species of surface treatment application, such as spray adhesive, would have been encompassed within the knowledge level of, or determined through undue experimentation by, one of ordinary skill in the art.

Regarding claims 27-28, Johnson discloses the method of claim 15, as above. Johnson does not expressly disclose where the liquid and/or vapor has a Kauri-butanol value in a particular range. This would have been determined through routine experimentation by one of ordinary skill in the art.

-- see supplemental box --

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITYInternational application No.  
PCT/US 09/43538

## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

-- Box No. V(3) -- Citations and explanations:

Regarding claim 30, Johnson discloses the process of claim 29, as above, where the refrigerant comprises at least about 70% by weight (para [0031]) of the trans stereoisomer (para [0013]; Markush structure - para [0014] - para [0017]). Johnson does not expressly disclose where the refrigerant comprises essentially about 90 wt% or more of the trans stereoisomer. The wt% of the trans stereoisomer would have been determined through routine experimentation by one of ordinary skill in the art.

Regarding claim 31, Johnson discloses the process of claim 29, as above, where the refrigerant comprises at least about 70% by weight (para [0031]) of the trans stereoisomer (para [0013]; Markush structure - para [0014] - para [0017]). Johnson does not expressly disclose where the refrigerant comprises essentially about 97 wt% or more of the trans stereoisomer. The wt% of the trans stereoisomer would have been determined through routine experimentation by one of ordinary skill in the art.

Regarding claim 34, Johnson discloses the process of claim 32, as above, where the refrigerant further comprises esters (para [0027]). Johnson does not expressly disclose particular species of ester co-solvents such as methyl formate, methyl acetate, ethyl formate and ethyl acetate. The particular species of ester co-solvents utilized would have been encompassed within the knowledge level of, or determined through undue experimentation by, one of ordinary skill in the art.

Claims 24 and 26 lack an inventive step under PCT Article 33(3) as being obvious over Johnson in view of WO 2007/053673 A2 to Nappa et al. (hereinafter Nappa).

Regarding claim 24, Johnson discloses the method of claim 15, as above. Johnson does not expressly disclose where such a method comprises dewatering. Nappa discloses a cleaning composition comprising a chlorine-containing unsaturated fluorinated olefin such as trans (Cl)CH=C(CH<sub>3</sub>)(CF<sub>3</sub>) (pg 19, ln 3-6; pg 21, ln 32 - pg 22, ln 7) [very similar to trans hydrochlorofluoroolefin 1233zd - (Cl)CH=CH(CF<sub>3</sub>)] and a co-solvent (pg 28, ln 1-18) utilized for dewatering (Abstract; pg 24, ln 6-7) and cleaning surfaces by removing contaminants from the surface (pg 29, ln 7-16; pg 30, ln 6-21). It would have been obvious to one of ordinary skill in the art to add the teachings of Nappa concerning a cleaning composition comprising a hydrochlorofluoroolefin utilized for dewatering and removing contaminants from surfaces to the teachings of Johnson concerning a method of removing contaminants from a surface comprising contacting the surface with a liquid and/or vapor comprising at least about 70% by weight of the trans stereoisomer of hydrochlorofluoroolefin 1233zd, as the technology is so similar (i.e., both teach removing contaminants from surfaces utilizing a trans hydrochlorofluoroolefin); in order to practice the claim as described without undue experimentation. This would have provided for structural variation of the hydrochlorofluoroolefin in order to have optimized the resultant compositional properties in the contaminant removal method; given such practice in the art.

Regarding claim 26, Johnson discloses the method of claim 15, as above. Johnson does not expressly disclose where such a method comprises removal of silicon depositions. Nappa discloses a cleaning composition comprising a chlorine-containing unsaturated fluorinated olefin such as trans (Cl)CH=C(CH<sub>3</sub>)(CF<sub>3</sub>) (pg 19, ln 3-6; pg 21, ln 32 - pg 22, ln 7) [very similar to trans hydrochlorofluoroolefin 1233zd - (Cl)CH=CH(CF<sub>3</sub>)] and a co-solvent (pg 28, ln 1-18) utilized for cleaning surfaces by removing contaminants from the surface (pg 29, ln 7-16; pg 30, ln 6-21). The term .contaminant. is intended to refer to any unwanted material or substance present on the article, even if such substance is placed on the article intentionally (pg 30, ln 6-21). It would have been encompassed within the knowledge level of one of ordinary skill in the art that in the manufacture of semiconductor devices it would have been desirable to remove unwanted silicon depositions. It would have been obvious to one of ordinary skill in the art to add the teachings of Nappa concerning a cleaning composition comprising a hydrochlorofluoroolefin utilized for removing contaminants from surfaces, such as unwanted silicon depositions from the surface(s) of semiconductor devices to the teachings of Johnson concerning a method of removing contaminants from a surface comprising contacting the surface with a liquid and/or vapor comprising at least about 70% by weight of the trans stereoisomer of hydrochlorofluoroolefin 1233zd, as the technology is so similar (i.e., both teach removing contaminants from surfaces utilizing a trans hydrochlorofluoroolefin); in order to practice the claim as described without undue experimentation. This would have provided for structural variation of the hydrochlorofluoroolefin in order to have optimized the resultant compositional properties in the contaminant removal method; given such practice in the art.

Claims 1-34 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.