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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))

(88) Date of publication of the international search report:
30 December 2009

(54) Title: A NOVEL ADDITIVE FOR NAPHTHENIC ACID CORROSION INHIBITION AND METHOD OF USING THE SAME

(57) Abstract: The present invention relates to the field of processing hydrocarbons which causes corrosion in the metal surfaces of processing units. The invention addresses the technical problem of high temperature naphthenic acid corrosion and sulphur corrosion and provides a solution to inhibit these types of corrosion. The three combination compositions are formed by two mixtures separately, with one mixture obtained by mixing compound A, which is obtained by reacting high reactive polyisobutylene (HRPIB) with phosphorous pentasulphide in presence of catalytic amount of sulphur with compound B which is thiophosphorous compound such as phosphorous thioacid ester of Formula (1) and second mixture obtained by mixing compound A with compound C of Formula (2) which is obtained by reacting compound B with ethylene oxide, wherein each of these two mixtures independently provide high corrosion inhibition efficiency in case of high temperature naphthenic acid corrosion inhibition and sulphur corrosion inhibition. The invention is useful in all hydrocarbon processing units, such as, refineries, distillation columns and other petrochemical industries.



WO 2009/063496 A3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN 08/00586

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - C09K 8/60 (2009.01) USPC - 507/245 According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) USPC -- 507/245 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC : 507/264, 934, 939; 166/902; 252/390, 392, 394, 403 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWEST(USPT,PGPB,EPAB,JPAB); DialogPRO(Engineering); Google Scholar Search Terms: phosphorus, sulfur, thioacid, ester, thiophosphorus, olefin/polyisobutylene, corrosion inhibitor/lubricant				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
Y	US 5,552,085 A (Babaian-Kibala) 03 Sep 1996 (03.09.1996), entire document especially col 4, ln 20-25, col 4, ln 5-10, col 6, ln 17-20	1-2, 7-10		
Y	US 2002/0107150 A1 (Mikami et al.) 08 Aug 2002 (08.08.2002), entire document especially Abstract and para [0038]	1-2, 7-10		
Y	US 3,909,447 A (Redmore et al.) 30 Sep 1975 (30.09.1975), entire document especially col 1, ln 55-65 and col 3, ln 1-25	9-10		
Y	US 4,906,391 A (Andress) 06 Mar 1990 (06.03.1990), entire document especially Abstract and col 1, ln 45-55	1-2 and 7-10		
☐ Further documents are listed in the continuation of Box C. ☐				
* Special categories of cited documents: <table border="0"> <tr> <td> "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family </td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family			
Date of the actual completion of the international search 15 July 2009 (15.07.2009)		Date of mailing of the international search report 24 AUG 2009		
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		Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774		

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IN 08/00586

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 12-13
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
Claims 12 and 13 are omnibus type claims, not drafted in accordance with Rule 6.2(a).
3. ☒ Claims Nos.: 3-6 and 11
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.