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ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: REDOX PROCESS PARTICULARLY FOR THE PRODUCTION OF MENADIONE AND USE OF POLYOXOMET-
ALATES

(57) Abstract: The present invention relates to a redox process particularly but not exclusively for producing menadione, which uses
Keggin-type heteropolycompounds as oxidizing agents. These compounds are polyoxometalates containing phosphorus, molybde-
num, tungsten, vanadium and oxygen, which by virtue of their chemical properties can be used as oxidizers in many redox processes.
This redox process can be applied advantageously to products obtained by virtue of a new process of alkylation of 1-naphthol with
alcohols. In a particularly preferred case of combination between the alkylation process and the redox process, the 1-naphthol is
alkylated with methanol to 2-methyl-1-naphthol, which is then oxidized to menadione.



WO 2004/014832 A3

INTERNATIONAL SEARCH REPORT

International Application No

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A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 C07C50/12 C07C46/06

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)
 IPC 7 C07C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Section Ch, Week 199526 Derwent Publications Ltd., London, GB; Class B05, AN 1995-198636 XP002263743 & RU 2 022 958 A (AS SIBE CATALYSIS INST) 15 November 1994 (1994-11-15) abstract	1-19, 37
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

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 "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
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DATABASE WPI Section Ch, Week 200047 Derwent Publications Ltd., London, GB; Class E14, AN 2000-523255 XP002263745 & RU 2 142 935 A (AS SIBE CATALYSIS INST) 20 December 1999 (1999-12-20) abstract	1-19,37
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 03/08485

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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.:
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:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

see additional sheet

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 an additional fee, this Authority did not invite payment of any additional fee.
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.
- ☒ No protest accompanied the payment of additional search fees.

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-19, 37

Process for the oxidation of a phenol or a naphthol by a polyoxometalate compound, and use of said compound in said process.

2. claims: 20-36

Process for the alkylation of 1-naphthol by an alcohol in the presence of a catalyst containing a mixed oxide of Mg and Fe.

INTERNATIONAL SEARCH REPORT

International Application No

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