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(54) Title: SINGLE-STEP CATALYTIC PREPARATION OF PARA-AMINOPHENOL

(57) Abstract: The present invention relates to the use of a bi-functional catalyst for the one-step preparation of para-aminophenol, said catalyst comprising a mixture of a hydrogenation noble metal and a zirconium sulfate. The present invention also relates to an improved single-step process for the preparation of para-aminophenol from nitrobenzene, in an aqueous medium, using said bi-functional catalyst.



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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER

INV. B01J23/40 B01J27/053 B01J35/00 C01G25/06 C07C213/00
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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)
B01J C01G 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, CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 028 227 A (CHAUDHARI RAGHUNATH VITTHAL [IN] ET AL) 22 February 2000 (2000-02-22) claims 1,3; examples 1-6 -----	1-20
Y	GB 1 181 969 A (INT NICKEL LTD [GB]) 18 February 1970 (1970-02-18) claims -----	1-20
Y	JP 61 056158 A (MITSUI TOATSU CHEMICALS) 20 March 1986 (1986-03-20) abstract -----	1-20
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Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
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- *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

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INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2008/065100

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>KOMATSU T ET AL: "Gas phase synthesis of para-aminophenol from nitrobenzene on Pt/zeolite catalysts" APPLIED CATALYSIS A: GENERAL, ELSEVIER SCIENCE, AMSTERDAM, NL, vol. 276, no. 1-2, 25 November 2004 (2004-11-25), pages 95-102, XP004613245 ISSN: 0926-860X the whole document</p>	1-20
Y	<p>SONG X ET AL: "SULFATED ZIRCONIA-BASED STRONG SOLID-ACID CATALYSTS: RECENT PROGRESS" CATALYSIS REVIEWS: SCIENCE AND ENGINEERING, MARCEL DEKKER INC. NEW YORK, US, vol. 38, no. 2, 1996, pages 329-412, XP001536474 ISSN: 0161-4940 page 331, paragraph 2; figure 1</p>	1-20
Y	<p>GB 610 549 A (F W BERK AND COMPANY LTD; FRED WILLIAM CHAMBERS) 18 October 1948 (1948-10-18) the whole document</p>	21-24
Y	<p>US 2005/175525 A1 (FU GUOYI [US] ET AL FU GUOYI [US] ET AL) 11 August 2005 (2005-08-11) example 1</p>	21-24
Y	<p>ZYUZIN ET AL: "X-ray, Raman and FTIRS studies of the microstructural evolution of zirconia particles caused by the thermal treatment" JOURNAL OF SOLID STATE CHEMISTRY, ORLANDO, FL, US, vol. 179, no. 10, 1 October 2006 (2006-10-01), pages 2965-2971, XP005624309 ISSN: 0022-4596 * 2. Experimental *</p>	21-24
Y	<p>CESÁRIO FRANCISCO DAS VIRGENS ET AL: "Influence of the preparation method on the textural properties of zirconia" REACTION KINETICS AND CATALYSIS LETTERS, KLUWER ACADEMIC PUBLISHERS, DO, vol. 84, no. 1, 1 January 2005 (2005-01-01), pages 183-188, XP019265328 ISSN: 1588-2837 * EXPERIMENTAL *</p>	21-24

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2008/065100

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DATABASE CA [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; LIU, QIYONG ET AL: "Process for production of superfine zirconia" XP002489261 retrieved from STN Database accession no. 2005:466443 abstract & CN 1 426 964 A (ZIBO GUANGTONG CHEMICAL CO. LTD., PEOP. REP. CHINA) 2 July 2003 (2003-07-02)	21-24
Y	DATABASE CA [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; CHEN, LING ET AL: "Method for preparing zirconium oxide nanopowders by ultrasonic sol-gel process" XP002489262 retrieved from STN Database accession no. 2005:1066961 abstract & CN 1 559 915 A (SOUTH CHINA UNIVERSITY OF TECHNOLOGY, PEOP. REP. CHINA) 5 January 2005 (2005-01-05)	21-24

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2008/065100

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.:
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 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:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
2. As all searchable claims could be searched without effort justifying an 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 reportcovers 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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-20

process for reacting nitrobenzene to p-aminphenol using
bifunctional catalyst comprising zirconium sulfate and noble
metal

2. claims: 21-24

process for preparation of zirconium sulfate

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2008/065100

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6028227	A	22-02-2000	NONE	
GB 1181969	A	18-02-1970	BE 722389 A CH 494734 A DE 1803101 A1 FR 1587963 A NL 6814316 A	16-04-1969 15-08-1970 21-08-1969 03-04-1970 18-04-1969
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CN 1559915	A	05-01-2005	NONE	