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(19) **United States**

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OTHMAN et al.

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(54) **ADSORBENT MATERIAL, PROCESS FOR ITS PREPARATION AND USE THEREOF**

**Publication Classification**

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(72) Inventors: **Mohammed A. OTHMAN**, Riyadh (SA); **Waleed M. ZAHID**, Riyadh (SA); **Ahmed E. ABASAEED**, Riyadh (SA)

(51) **Int. Cl.**  
*B01J 20/30* (2006.01)  
*B01D 53/50* (2006.01)  
*B01D 53/52* (2006.01)  
*B01J 20/06* (2006.01)  
*B01D 53/48* (2006.01)

(73) Assignee: **King Saud University**, Riyadh (SA)

(52) **U.S. Cl.**  
CPC ..... *B01J 20/3078* (2013.01); *B01J 20/06* (2013.01); *B01D 53/48* (2013.01); *B01D 53/52* (2013.01); *B01D 53/508* (2013.01)  
USPC ..... **423/231**; 252/191; 423/244.06

(21) Appl. No.: **14/247,289**

(57) **ABSTRACT**

(22) Filed: **Apr. 8, 2014**

(30) **Foreign Application Priority Data**

May 27, 2013 (EP) ..... 13169355.8

The present invention discloses an adsorbent material having the following formula:  $Cu_w ZnFe_x Al_y (OH)_z (A)_{(y+z)/2} mH_2O$ , wherein  $w+x+y+z=1$ ; and  $0.20 \leq w \leq 0.60$ ;  $0.20 \leq x \leq 0.60$ ;  $0.05 \leq y \leq 0.25$ ;  $0.05 \leq z \leq 0.25$ ;  $0.20 \leq (y+z) \leq 0.33$ ; and  $0.50 \leq m \leq 0.80$ ; a process for producing the adsorbent material and its use for removing sulfur-containing matter from gaseous streams.



US007942972B2

(12) **United States Patent**  
Al Nashef et al.

(10) **Patent No.: US 7,942,972 B2**  
(45) **Date of Patent: May 17, 2011**

(54) **METHOD FOR SEPARATING FRUCTOSE AND GLUCOSE**

(75) Inventors: **Inas M. Al Nashef**, Riyadh (SA); **Mohamed H. Gaily**, Riyadh (SA); **Saeed M. Al-Zahrani**, Riyadh (SA); **Ahmed E. Abasaeed**, Riyadh (SA)

(73) Assignee: **King Saud University**, Riyadh (SA)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 518 days.

(21) Appl. No.: **12/119,522**

(22) Filed: **May 13, 2008**

Forsyth et al. "Ionic Liquids-An Overview". Abstract Only, (2004).  
Liu et al. "Room-temperature ionic liquids that dissolve carbohydrates in high concentrations", Green Chemistry, (2005) pp. 39-42.\*  
Youngs et al. "Glucose Solvation by the Ionic Liquid . . .", J. Phys. Chem. B (Nov. 2007) pp. 13765-13774.\*  
Murugesan et al. "Ionic Liquids in Carbohydrate Chemistry—Current Trends and Future Directions", Current Organic Synthesis, (2005), pp. 437-451.\*  
Spear et al. "Ionic Liquids: Green Solvents for Carbohydrate Studies", 2002 SPRI Conference Abstracts of Presentations, (Mar. 2002), Poster Abstract.\*

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Primary Examiner — David M Brunzman

(74) Attorney, Agent, or Firm — Lowe Hauptman Ham & Berner, LLP



US007256319B2

(12) **United States Patent**  
**Al-Zahrani et al.**

(10) **Patent No.:** **US 7,256,319 B2**  
(45) **Date of Patent:** **Aug. 14, 2007**

(54) **CATALYSTS FOR PRODUCTION OF OLEFINS BY OXIDATIVE DEHYDROGENATION, AND METHODS OF MAKING AND USING THE SAME**

4,474,897 A 10/1984 Hobbs ..... 502/242  
5,162,597 A 11/1992 Wu ..... 585/646  
5,468,710 A 11/1995 Regasco ..... 502/221  
5,527,929 A 6/1996 Agaskar ..... 585/659  
5,759,946 A 6/1998 Hoang ..... 502/303  
5,852,219 A 12/1998 Sauer et al. .... 568/71

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**Ahmad E. Abasaheed**, Riyadh (SA);  
**Nimir O. Elbashir**, Riyadh (SA);  
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EP 0428413 5/1991  
EP 0434546 6/1991  
EP 0480594 4/1992  
EP 0557790 9/1993  
EP 0958860 A2 11/1999

(73) Assignee: **Saudi Basic Industries Corporation**,  
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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 252 days.

**OTHER PUBLICATIONS**

European Search Report in EPO 01 112 978 dated Oct. 15, 2001.  
ESP@CENET Database, Abstract of Japan Patent Publication No. 7010782, Jan. 13, 1995.

(21) Appl. No.: **10/383,975**

*Primary Examiner*—Thuan Dinh Dang

(22) Filed: **Mar. 7, 2003**

(74) *Attorney, Agent, or Firm*—William J. Spatz; Jim D. Wheelington

(65) **Prior Publication Data**

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(57) **ABSTRACT**



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(12) **United States Patent**  
**Al-Zahrani et al.**

(10) **Patent No.:** **US 6,541,418 B1**  
(45) **Date of Patent:** **Apr. 1, 2003**

(54) **CATALYST SYSTEMS FOR THE OXIDATIVE DEHYDROGENATION OF HYDROCARBONS**

5,595,719 A 1/1997 Ul-Haque et al.  
5,599,517 A 2/1997 Ul-Haque et al.  
5,759,946 A 6/1998 Hoang et al.

(75) Inventors: **Saeed M. Al-Zahrani**, Riyadh (SA);  
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**Nimir O. Elbashir**, Riyadh (SA);  
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**FOREIGN PATENT DOCUMENTS**

DE 2030 699 1/1971

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**OTHER PUBLICATIONS**

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 201 days.

Derwent Database, Abstract of European Pat. Publication No. 557790, Sep. 1993.

Derwent Database, Abstract of Japanese Pat. No. 3218327, Sep. 1991.



(19)  
 Bundesrepublik Deutschland  
 Deutsches Patent- und Markenamt

(10) **DE 600 34 295 T2** 2008.01.03

(12) **Übersetzung der europäischen Patentschrift**

(97) **EP 1 103 302 B1**  
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 (96) Europäischer Anmeldetag: **25.08.2000**  
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**C07C 5/48** (2006.01)  
**B01J 23/843** (2006.01)

(30) Unionspriorität:  
**99123447**      **24.11.1999**      **EP**  
 (73) Patentinhaber:  
**Saudi Basic Industries Corp., Riyadh, SA**  
 (74) Vertreter:  
**derzeit kein Vertreter bestellt**

(84) Benannte Vertragsstaaten:  
**AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE**

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(54) Bezeichnung: **Oxidative Dehydrierung von Paraffinen**



(11) **EP 2 808 079 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**03.12.2014** Bulletin 2014/49

(51) Int Cl.:  
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(21) Application number: **13169355.8**

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(84) Designated Contracting States:  
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 Designated Extension States:  
**BA ME**

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(72) Inventors:  
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(54) **Adsorbent material, process for its preparation and use thereof**



(11) **EP 1 516 666 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:  
07.03.2007 Bulletin 2007/10

(51) Int Cl.:  
*B01J 23/30* <sup>(2006.01)</sup> *B01J 23/00* <sup>(2006.01)</sup>  
*C07C 5/48* <sup>(2006.01)</sup>

(21) Application number: 04029646.9

(22) Date of filing: 08.06.2001

(54) **Catalysts for production of olefins by oxidative dehydrogenation**  
Katalysatoren für die Herstellung von Olefinen durch oxidative Dehydrierung  
Catalyseurs pour la production des oléfines par deshydrogénation oxydante

(84) Designated Contracting States:  
DE FR GB IT NL

(30) Priority: 27.06.2000 US 604181

(43) Date of publication of application:  
23.03.2005 Bulletin 2005/12

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:  
01112978.0 / 1 166 869

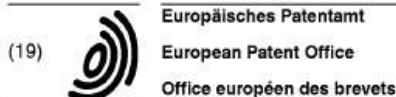
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(56) References cited:  
EP-A- 0 958 860 US-A- 4 110 253  
US-A- 4 474 897 US-A- 5 162 597  
US-A- 5 852 219



(11) **EP 1 516 666 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
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(51) Int Cl.: **B01J 23/30**, B01J 23/00,  
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(21) Application number: 04029646.9

(22) Date of filing: 08.06.2001

(84) Designated Contracting States:  
DE FR GB IT NL

(30) Priority: 27.06.2000 US 604181

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:  
01112978.0 / 1 166 869

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Remarks:  
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under INID code 62.

(54) **Catalysts for production of olefins by oxidative dehydrogenation**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent: 15.02.2006 Bulletin 2006/07  
(51) Int Cl.: B01J 23/30<sup>(2006.01)</sup> B01J 23/00<sup>(2006.01)</sup>  
C07C 5/48<sup>(2006.01)</sup>

(21) Application number: 01112978.0

(22) Date of filing: 08.06.2001

(54) **Method of producing olefins by oxidative dehydrogenation**

Verfahren für die Herstellung von Olefinen durch oxidative Dehydrierung  
Procédé pour la production des oléfines par deshydrogénation oxydante

(84) Designated Contracting States:  
DE FR GB IT NL

(30) Priority: 27.06.2000 US 604181

(43) Date of publication of application:  
02.01.2002 Bulletin 2002/01

(60) Divisional application:  
04029646.9 / 1 516 666

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(56) References cited:  
EP-A- 0 958 860 US-A- 4 110 253  
US-A- 4 474 897 US-A- 5 162 597  
US-A- 5 852 219

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication: 02.01.2002 Bulletin 2002/01  
(51) Int Cl.7: B01J 23/30, B01J 23/00,  
C07C 5/48

(21) Application number: 01112978.0

(22) Date of filing: 08.06.2001

(84) Designated Contracting States:  
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE TR  
Designated Extension States:  
AL LT LV MK RO SI

(30) Priority: 27.06.2000 US 604181

(71) Applicant: SAUDI BASIC INDUSTRIES  
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• Elbashir, Nimir O.  
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(54) **Catalysts for production of olefins by oxidative dehydrogenation, methods of making and using the same**



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**30.05.2001 Bulletin 2001/22**

(51) Int.Cl.7: **B01J 23/18, C07C 5/48,  
B01J 23/843**

(21) Application number: **00118101.5**

(22) Date of filing: **25.08.2000**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

(30) Priority: **24.11.1999 EP 99123447**

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(54) **New catalyst systems for the oxidative dehydrogenation of hydrocarbons**