



- (51) International Patent Classification:
B01J 20/26 (2006.01) *B01J 20/34* (2006.01)
- (21) International Application Number:
PCT/US2015/060082
- (22) International Filing Date:
11 November 2015 (11.11.2015)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
14/540,976 13 November 2014 (13.11.2014) US
- (71) Applicant: **ABTECH INDUSTRIES, INC.** [US/US];
4110 North Scottsdale Road, Suite 235, Scottsdale, AZ
85251 (US).
- (72) Inventor: **ROGERS, Chad, A.**; 4110 North Scottsdale
Road, Suite 235, Scottsdale, AZ 85251 (US).
- (74) Agent: **HOFFMAN, Louis, J.**; Louis J. Hoffman, P.C.,
14301 North 87th Street, Suite 312, Scottsdale, AZ 85260
(US).
- (81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,

KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,
SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ,
TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a
patent (Rule 4.17(ii))*

Published:

- *with international search report (Art. 21(3))*
— *before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:

1 September 2016



WO 2016/077418 A3

(54) Title: PROCESS FOR RECYCLING OIL-SORBING POLYMERIC MEDIA

(57) Abstract: Recycling spent hydrophobic polymeric media can beneficially utilize waste oil to dissolve the media. The method employs simple equipment and materials, many or all of which are already on location in various industrial operations such as fracking operations or food production factories. The method does not call for landfilling spent media, thus reducing the environmental impact and reducing expense. Transport costs for spent media and disposal fees can likely decrease. The resulting product can be sold to refineries for further processing and repurposing, thus generating additional revenue.

A. CLASSIFICATION OF SUBJECT MATTER**B01J 20/26(2006.01)i, B01J 20/34(2006.01)i**

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 20/26; B03B 1/04; E02B 15/10; E02B 15/04; C02B 9/02; B01D 15/06; B01J 1/09; C02F 1/68; B01D 15/00; B01J 20/00; B01J 20/34

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: recycle, reuse, regenerate, recover, absorbent, superabsorbent, hydrophobic, oleophilic, waste oil, complementary solvent, SBS, SIS, SEBS, SBS-EPDM, gel, dissolve, swelling

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	BOUVIER, J. M. et al., "Pyrolysis of rubber wastes in heavy oils and use of the products," Resources and Conservation, 1986, vol. 12, pp. 77-93 See abstract; pages 78-81, 90-93; and tables 1-3, 12-16.	1-25
X	GARCIA, MARIA TERESA et al., "Study of the solubility and stability of polystyrene wastes in a dissolution recycling process," Waste Management, 2009, vol. 29, pp. 1814-1818 See abstract; pages 1815-1818; and tables 1-7.	1-25
X	ARANDES, JOSE M. et al., "Thermal recycling of polystyrene and polystyrene-butadiene dissolved in a light cycle oil," Journal of Analytical and Applied Pyrolysis, 2003, vol. 70, pp. 747-760 abstract; and page 748, line 40-page 749, line 11.	1-25
A	ZHOU, MEI HUA et al., "Oil absorbents based on styrene-butadiene rubber," Journal of Applied Polymer Science, 2003, vol. 89, pp. 1818-1824 See abstract; page 1820, right column-page 1823, left column; figures 1-5; and tables I, II	1-25

 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 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

26 July 2016 (26.07.2016)

Date of mailing of the international search report

26 July 2016 (26.07.2016)

Name and mailing address of the ISA/KR

International Application Division

Korean Intellectual Property Office

189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea

Facsimile No. +82-42-481-8578

Authorized officer

CHO, Han Sol

Telephone No. +82-42-481-5580



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/060082

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PRPICH, GEORGE P. et al., "On the use, and reuse, of polymers for the treatment of hydrocarbon contaminated water via a solid-liquid partitioning bioreactor," <i>Biotechnology Progress</i> , 2008, vol. 24, pp. 839-844 See abstract; pages 840-841; and table 2.	1-25
A	US 7229560 B2 (RINK, GLENN R. et al.) 12 June 2007 See abstract; column 1, lines 15-20; column 4, lines 45-53; column 10, lines 14-59; and claim 1.	1-25
A	US 6143172 A (RINK, GLENN R. et al.) 07 November 2000 See abstract; column 9, lines 45-49; and claims 1, 2.	1-25
A	US 2012-0055852 A1 (SOANE, DAVID S. et al.) 08 March 2012 See abstract; paragraphs [0009]-[0011]; and claims 11-21.	1-25
A	US 4061566 A (MODELL, MICHAEL) 06 December 1977 See abstract; and claim 1.	1-25
A	US 4094776 A (NOGUCHI, KOSAKU et al.) 13 June 1978 See abstract; and claim 1.	1-25

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2015/060082

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7229560 B2	12/06/2007	AT 283725 T	15/12/2004
		AU 5911098 A	03/08/1998
		AU 732308 B2	12/04/2001
		BR 9807070 A	02/05/2000
		CA 2277163 A1	16/07/1998
		CA 2277163 C	10/05/2005
		CN 1243450 A	02/02/2000
		CN 1251782 C	19/04/2006
		EP 0973593 A1	26/01/2000
		EP 0973593 A4	21/08/2002
		EP 0973593 B1	01/12/2004
		HK 1025529 A1	08/12/2006
		JP 2002-515087 A	21/05/2002
		JP 4164707 B2	15/10/2008
		KR 10-0593867 B1	03/07/2006
		KR 10-2000-0070056 A	25/11/2000
		US 2002-0165318 A1	07/11/2002
		US 2003-0225211 A1	04/12/2003
		US 2005-0151289 A1	14/07/2005
		US 6344519 B1	05/02/2002
		US 6541569 B1	01/04/2003
US 6723791 B2	20/04/2004		
US 7048878 B2	23/05/2006		
WO 98-30303 A1	16/07/1998		
US 6143172 A	07/11/2000	US 5863440 A	26/01/1999
		WO 97-44279 A1	27/11/1997
US 2012-0055852 A1	08/03/2012	US 2015-013721 A1	15/01/2015
		US 8758629 B2	24/06/2014
		WO 2011-109598 A1	09/09/2011
US 4061566 A	06/12/1977	JP 51-061484 A	28/05/1976
		JP 52-126677 A	24/10/1977
		JP 59-024854 B2	12/06/1984
		JP 61-012758 B2	09/04/1986
		US 4124528 A	07/11/1978
US 4094776 A	13/06/1978	JP 52-044783 A	08/04/1977
		JP 52-065790 A	31/05/1977
		JP 53-018475 B2	15/06/1978
		JP 53-018476 B2	15/06/1978
		US 4209382 A	24/06/1980