



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : C04B 18/02, C22B 1/14, C04B 40/02, 18/06</p>	<p>A3</p>	<p>(11) International Publication Number: WO 97/17307 (43) International Publication Date: 15 May 1997 (15.05.97)</p>
<p>(21) International Application Number: PCT/EP96/04849 (22) International Filing Date: 5 November 1996 (05.11.96) (30) Priority Data: 95/9358 6 November 1995 (06.11.95) ZA 95203578.0 22 December 1995 (22.12.95) EP (34) Countries for which the regional or international application was filed: AT et al. 96/0280 15 January 1996 (15.01.96) ZA (71) Applicants (for all designated States except US): AECI LIMITED [ZA/ZA]; Office Tower, 16th floor, Carlton Centre, Commissioner Street, Johannesburg (ZA). HOOGOVS TECHNICAL SERVICES ENERGY & ENVIRONMENT B.V. [NL/NL]; Kesslerplein 1, NL-1951 JZ Velsen-Noord (NL). (72) Inventors; and (75) Inventors/Applicants (for US only): STOTT, Karl, Reginald [GB/ZA]; 660 Kingsway, Athlone Park, Kwazulu Natal 4126 (ZA). WHITE, Leroy, Alan [ZA/ZA]; 24 Ebony Crescent, Dowerglen, Edenvale, Gauteng 1620 (ZA). BRESLER, André, Christiaan [ZA/ZA]; 8 Duke Road, Hurlyvale, Edenvale, Gauteng 1610 (ZA). MAHADEW, Dewanand</p>	<p>[NL/NL]; Gouwsluisseweg 49, NL-2405 XZ Alphen an de Rijn (NL). (74) Agent: HANSEN, Willem, Joseph, Maria; Hoogovens Corporate Services B.V., P.O. Box 10000, NL-1970 CA Ijmuiden (NL). (81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 21 August 1997 (21.08.97)</p>	
<p>(54) Title: METHOD FOR PREPARING HARDENED GRANULES FROM A PARTICULATE MATERIAL</p>		
<p>(57) Abstract</p>		
<p>A method for preparing hardened granules from a particulate material which comprises admixing to the particulate material an aqueous inorganic binder, converting the resulting moist mixture into granules and hardening said granules, characterised in that it comprises the steps of: (i) selecting a particulate material comprising ingredients suitable as a raw material or an agent in a selected chemical or physical process; (ii) where applicable bringing the particulate material to a particle size distribution suitable for aggregation into granules; (iii) composing and mixing a mixture comprising: the particulate material; an aqueous inorganic binder selected from the group consisting of a calcareous binder, cementitious binder, hydraulic cement, Portland cement, high alumina cement, a mixture of a source of calciumhydroxide with a source of silica, lime, gypsum and dolomite; bringing about a moisture content so that a granulatable mixture is obtained; (iv) forming granules; (v) hardening said granules at a temperature above room temperature and below the boiling temperature of the moisture whilst sticking together of the granules is avoided and where applicable excess moisture from the granules is extracted; (vi) withdrawing the hardened granules in the form of a feed stock component for said selected process.</p>		

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 96/04849

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 C04B18/02 C22B1/14 C04B40/02 C04B18/06

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 6 C04B C22B

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 367 914 A (EIRICH HUBERT ;EIRICH PAUL (DE); EIRICH WALTER (DE)) 16 May 1990 see page 3, line 41 - page 3, line 45 see page 4, line 21 - page 4, line 28 see claims 13,15,16; example 2	1,2,10, 11,17
Y	---	12-16
X	US 4 106 929 A (SAITO TAMEKAZU ET AL) 15 August 1978 see column 3, line 66 - column 4, line 33 see column 3, line 41 - column 3, line 47 see column 5, line 34 - column 5, line 63 see column 4, line 21 - column 4, line 33 see claim 1; example 1 see column 6, line 31 - column 6, line 41	1-3, 6-11,17, 20
Y	---	12-16
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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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- "E" earlier document but published on or after the international filing date
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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
- "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

25 June 1997

Date of mailing of the international search report

11. 07. 97

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Mini, A

INTERNATIONAL SEARCH REPORT

 Int. Application No
 PCT/EP 96/04849

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CHEMICAL ABSTRACTS, vol. 108, no. 20, 16 May 1988 Columbus, Ohio, US; abstract no. 172520j, YAMAMOTO, TADASHI ET AL.: "lightweight building materials" XP002025915	1,2
Y	see abstract & JP 06 300 548 A	12-16
X	--- US 5 364 447 A (PHILIPP CARL T ET AL) 15 November 1994 see column 11, line 50 - column 12, line 5 see claims 1,2	1,2,10, 11,20
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X	--- DE 10 40 253 B (GELSENKIRCHENER BERGWERKS-AKTIEN-GESELLSCHAFT) 2 October 1958 see claims 1-10	1,9-11, 17,19
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X	--- DE 36 29 228 A (METALLGESELLSCHAFT AG) 10 March 1988 see column 1, line 37 - column 1, line 60 see column 3, line 3 - column 3, line 12 see column 3, line 44 - column 3, line 66; claim 6	24
X	--- DE 38 34 751 A (ACKERMANN MANFRED) 19 April 1990 see claims 1,6	26
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2 5	X DE 43 45 168 A (DEGUSSA) 3 November 1994 see page 6; claims 1-3; table 2	25

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INTERNATIONAL SEARCH REPORT

Int. Patent Application No
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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	DE 43 40 786 A (MARIOTTI NORBERTO) 1 June 1995 see claims 1,6	26
X	<p style="text-align: center;">---</p> WO 81 03499 A (SSAB DIVISION GRUVOR ;LINDER R (SE)) 10 December 1981 see page 1, line 13 - page 2, line 6 see page 4, line 1 - page 4, line 28 see page 5, line 21 - page 6, line 30 see page 8, line 17 - page 8, line 32 see page 10, line 15 - page 10, line 16 see page 13, line 9 - page 15, line 5 <p style="text-align: center;">-----</p>	1,6-8, 10,11, 17,23, 27-29

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/EP 96/04849

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:

Please see attached 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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/210

- I. Claims: 1, 2, 10-18, 20 (method for preparing hardened granules from a particulate material comprising combustible carbon and a specific inorganic binder usable as a fuel, as a reducing agent or as a carbide production raw material);
- II. Claims: 1, 3-5, 1-8, 10-17, 20-22, 27-29 (method for preparing hardened granules from a particulate material comprising a carbonaceous material and a specific inorganic binder usable as an adsorbent);
- III. Claims: 1, 6-8, 10-17, 23 (method for preparing hardened granules from a metal-containing particulate material and a specific inorganic binder usable for the production of metals or alloys);
- IV. Claims 1, 9, 10-17, 19 (method for preparing hardened granules from any particulate material usable as a gasification raw material)
- V. Claims: 24 (granulate comprising a combustible carbonaceous material or a metallic or a metalliferous material and a specific inorganic binder);
- VI. Claims: 25 (granulate of specific hardness comprising more than 25 wt% of carbon and/or more than 10 wt% of a metal in metallic or metalliferous form);
- VII. Claims: 26 (granulate of any composition having been hardened below 150°C)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 96/04849

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