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(54) Title: A PROCESS FOR THE PRODUCTION OF HYDROCARBONS INCLUDING OLEFINS FROM SYNTHESIS GAS

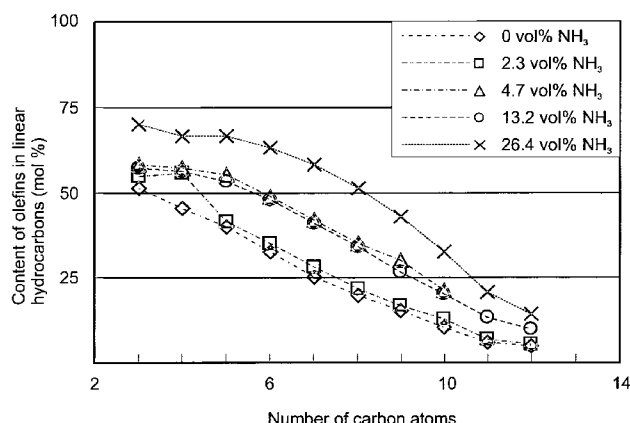


Figure 1

(57) Abstract: A process is provided for the production of hydrocarbons that include olefins from synthesis gas containing at least one of carbon monoxide and or carbon dioxide wherein the synthesis gas is fed to a reactor in which a catalyst acts on the feed at a temperature of between 160 °C and 400°C and a pressure of between 1 bar and 50 bar. The feed includes a compound containing one or both of nitrogen and phosphorous, such as ammonia and a phosphine, added to the reactor with the synthesis gas. The compound containing nitrogen typically constitutes at least 1 vol% and preferably of the order of 4 to 20 vol% or more of the feed. The carbonaceous gas may be carbon monoxide with a ratio of hydrogen to carbon monoxide in the synthesis gas of from 0.5:1 to 5:1. The catalyst is preferably a supported cobalt catalyst and may be modified with a promoter. The process produces an enhanced proportion of olefins, especially linear olefins, in the hydrocarbons produced.





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A. CLASSIFICATION OF SUBJECT MATTER IPC ⁸ : C07C 1/04 (2006.01); C07C 1/12 (2006.01) 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 ⁸ : 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 practicable, search terms used) WPI, EPODOC		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/0254966 A1 (ESKIN et al.) 01 November 2007 (01.11.2007) <i>Claims; page 2, [0024]</i>	1-4,6-15
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X	US 6 586 480 B1 (ZHOU et. al.) 01 July 2003 (01.07.2003) <i>Claims; examples; column 3, line 43 - 58</i>	1-4,6-9,11-15
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X	US 2005/0154069 A1 (INGA et al.) 14 July 2005 (14.07.2005) <i>Claims; page 2, [0025]</i>	1-4,6-15

<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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		
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Name and mailing address of the ISA/ AT Austrian Patent Office Dresdner Straße 87, A-1200 Vienna Facsimile No. +43 / 1 / 534 24 / 535		Authorized officer PAMMINGER W. Telephone No. +43 / 1 / 534 24 / 223

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US A 2007254966		NO A 20085003	2008-12-01
		KR A 20090007774	2009-01-20
		WO A2 2007146507	2007-12-21
		JP T 2009535494T	2009-10-01
		EP A2 2019815	2009-02-04
		CN A 101437780	2009-05-20
US A 6586480		CN A 1473797	2004-02-11
		US B1 6586480	2003-07-01
US A 2005154069		WO A1 2005071044	2005-08-04
		US A1 2005154069	2005-07-14