with CO_2, it is a suitable feedstock for hydrogen production. Taking credit for enhanced natural gas recovery reduces the penalty for sequestration to a net incremental cost of typically 2%. These cost penalties are much lower than those typical of CO_2 removal schemes associated with electricity production.

97/01077 Hydrogen production via plasma reformers

O'Brien, C. J. *et al.* *Proc. Intersoc. Energy. Convers. Eng. Conf.*, 1996, 31, 1747–1752.

Presents details of an investigation into the potential for efficient production of hydrogen-rich gas from hydrocarbon fuels using thermal plasmas. An experimental reformer has been constructed that uses a rotated electric arc plasma as a source of high temperatures and radicals to drive the partial oxidation reaction. Initial experimental results show that nearly complete conversion of methane to a hydrogen-rich mixture can be accomplished with an energy input of 20.3 MJ/kg of synthesis gas produced, at residence times of less than 50 ms. A reformer of this type is ideally suited to application as part of an integrated power system where load following is required, such as fuel cell systems for transportation.

97/01078 Improving synthesis gas production using autogenous reforming

Wu, S. *Huagong Jinzhan*, 1996, (2), 43–46. (In Chinese)

Presents the results of a study into the production of synthesis gas was studied by autogenous reforming which consists of partial oxidation and adiabatic steam treatment. The process can reduce costs, save energy, minimize environmental impacts and improve burner efficiencies.

97/01079 Investigation of deuterium isotope effects in the carbon dioxide reforming of methane to syngas over rhodium catalysts

Wang, H. Y. and Au, C. T. *Chin. Chem. Lett.*, 1996, 7, (11), 1047–1050.

Presents the findings of an investigation into the deuterium isotope effects in the CO_2-reforming of methane to syngas over SiO_2-supported rhodium catalysts.

97/01080 Italian refinery gasification project to make electricity, steam, and H_2 from tar

Aalund, L. R. *Oil Gas J.*, 1996, 94, (43), 33–35.

The plant deatiled will gasify 18,000 b/d of tar from visbroken vacuum residue and produce low-pressure steam, hydrogen, and enough synthesis gas to fuel turbines generating 550 MW of electricity. The design for the gasification section of the plant allows a feedstock containing up to 6% sulfur with about 1000 ppm nickel plus vanadium.

97/01081 Low temperature hydrogasification of biomass char catalyzed by iron. Effect of cell wall swelling and demineralization as the pretreatment

Funaki, M. *et al.* *Sekitan Kagaku Kaigi Happya Ranbunshu*, 1994, 31, 56–59 (In Japanese)..

Presents an investigation into the effect of cell wall swelling and demineralization on the preparation of iron-loaded oak bark chars. These were prepared at 500°C by carbonization and their hydrogasification reactivities were measured in a thermobalance. In order to swell the cell wall structure, raw bark was soaked in boiling water or extracted in water with supercritical carbon dioxide. Demineralization was carried out by washing with 0.1 N NCl. Either swelling was beneficial for improvement in the dispersity of iron metal particles on char, by which iron raised the catalytic activity in the hydrogasification.

97/01082 Manufacture of methane from coal

Murata, T. *Gekhan Haikibutsu*, 1996, 22, (6), 122–125 (In Japanese).

A review on production of methane from coal including the energy efficiency of thermal power generation, the manufacture of methane from wastes, and coal gasification technologies.

97/01083 Manufacture of synthetic fuel gas

Huang, C. K. Taiwan Ger. Offen. DE 19, 504, 979 (Cl. C1OL3/00), 29 Aug 1996, Appl. 19, 504, 979, 15 Feb 1995, 5 pp. (In German).

Describes a procedure for the manufacture of sythetic fuel gas The gas has a high calorific value and the CO/CO_2 ratio in the combustion gases is only 0.0002:1.

97/01084 Manufacture of town gas from synthesis gas suitable for methanol synthesis

Mueller, W.-D. *et al.* Ger. Offen. DE 19, 507, 098 (Cl. C1OK3/04), 5 Sep 1996, Appl. 19, 507, 098, 1 Mar 1995, 6 pp. (In German)

Comprehensively details a method for the manufacture of town gas containing 20–50 vol.% CH_4. A portion of the synthesis gas (which is not subjected to saturation with H_2O (g)) is used for the manufacture of MeOH and/or Fischer–Tropsch synthesis.

97/01085 Material having layered structure of hydro talcite type, and uses thereof

Basini, L. *et al.* Eur. Pat. Appl. EP 725, 038 (Cl. CO1GSS/00), 7 Aug 1996, IT Appl. 95/MI184, 3 Feb 1995, 15 pp.

The article is concerned with a material containing rhodium and/ or ruthenium, with a layered structure of hydrotalcite type, suitable in particular for the partial oxidation of methane to yield synthesis gas.

97/01086 Mechanism of methane partial oxidation over SiO_2-supported nickel catalyst

Wang, H.-Y. *et al.* *Chem. Res. Chin. Univ.*, 1996, 12, (3), 285–290.

A study into the partial oxidation reaction of methane over reduced 10 wt.% Ni/SiO_2 catalyst at 600, 650 and 700°C by means of pulse and bond-order conservation Morse-potential (BOC-MP) methods is presented. It was observed, in the oxidation reaction of surface carbon deposited on the catalyst, that the product selectivity was subject to the reaction temperature and the selectivity of CO was increased with raising temperature when the molar ratio of surface carbon to oxygen was above one. In the reaction of $CH4/O_2$, the same trend between CO selectivity and reaction temperature was also observed, implying that the partial oxidation of methane to synthesis gas follows the pyrolysis mechanism under the reaction conditions.

97/01087 Methane conversion for application in fuel cells

Mulder, A. *et al.* *Proc. Intersoc. Energy Convers. Eng. Conf.*, 1996, 31, 1090–1094.

Presents an alternative to conventional steam reforming—the partial oxidation of methane to synthesis gas. This process is slightly exothermic. The flexibility of the process makes small scale application possible. The results of the study on the mechanism of the partial oxidation to synthesis gas on silica-supported nickel catalysts are discussed. A process for the partial oxidation is proposed in which air instead of oxygen can be used. Two processes for the catalytic partial oxidation are proposed and simulated using the Aspen Plus flowsheeting programme.

97/01088 Methane reforming reaction with carbon dioxide over a Ni/SiO_2 catalyst: the nature of the active phase

Kroll, V. C. H. *et al.* *Kinet. Catal. (Transl. of Kinet. Katal.)*, 1996, 37, (5), 697–705.

This article presents a study into the nature of the active phase of a Ni/SiO_2 catalyst for the CO_2 reforming of methane. It is shown that nickel carbide-like layers, established in the very initial period of the run, constitute the active phase for this reaction. The related carbon adspecies are in equilibrium with gaseous methane and can also be irreversibly converted into CO with oxygen adspecies arising from the carbon dioxide activation. The amount of carbon equivalent to a carbide sublayer dissolves rapidly. This carbon, diffusing through the particles, is related to the formation of external carbon deposits.

97/01089 Method and apparatus for gasifying organic materials and vitrifying residual ash

Bishop, N. G. and Taylor, D. G. U.S. 5,584,255 (Cl. 110-235; F23G5/00), 17 Dec 1996, Appl. 473, 271, 7 Jun 1995, 6 pp.

This article discloses a method and apparatus for gasifying organic materials in a gasification reactor and vitrifying residual ash in a melting furnace.

97/01090 Method and reactor for coal gasification in low-temperature plasma

Karpenko, E. I. *et al.* Russ. RU 2, 062, 287 (Cl. C1OJ3/18), 20 Jun 1996, Appl. 94, 013, 145, 14 Apr 1994. (In Russian) From *Izobreteniya* 1996, (17), 194.

97/01091 Method and systems for automatic control for methane fermentation apparatus.

Tatara, M. *et al.* Jpn. Kokai Tokkyo Koho JP 08, 154, 662 [96, 154, 662] (Cl. C12M1/36), 18 Jun 1996, Appl. 94/329, 215, 5 Dec 1994, 9 pp (In Japanese).

Considers a method fo the automatic control of CH_4 fermentation. The fermentation is controlled by determining the activity of methanogene by measuring the fluorescence intensity of a fluorescent F_{420} and adjusting the feeding of raw materials for the fermentation accordingly. The systems include a CH_4 fermentation tank, a line for sampling the liquid in the tank, a pretreatment means for diluting the sample and optionally treating it with alkali or heat, a fluorescent spectrometer measuring the fluorescence intensity of the fluorescent F_{420}, a means to determine the activity of the methanogene depending the measured fluorescence intensity, and a means adjusting the feed of the raw material depending on the calculated methanogene activity.

97/01092 Method for feeding regeneration offgas into a gasifier

Vaeaeraenen, T. M. PCT Int. Appl. WO 96 30, 465 (Cl. C1OK1/26), 3 Oct 1996, U.S. Appl. 413, 486, 30 Mar 1995, 14 pp.

The invention detailed in this paper relates to a method for feeding regeneration offgas into a gasifier in the production of product gas by gasifying sulfurous fuel. The obtained product gas is passed into a sulfur removal reactor containing metal oxide sorbent, the metal oxide sorbent