

petroleum prices after the Asian crisis. In the international gasoline spot markets, movements in the NYMEX gasoline price are found to precede movements in the Gulf Coast and Rotterdam gasoline prices in the pre-crisis period, and the movements of these prices and those of the Singapore price in the post-crisis period, implying that the NYMEX price is the gasoline leader in both periods. The Monday/Friday day-of-the-week effect is only significant for the NYMEX gasoline 1-month and 3-month futures prices and the Gulf Coast gasoline spot. Economic and political shocks related to the spot prices have greater impacts on all prices than shocks related to the futures prices, regardless of the petroleum type and the time period.

Derived liquid fuels

04/01786 Autothermal reforming – a preferred technology in natural gas conversion for GTL applications

Christensen, T. S. *et al. American Institute of Chemical Engineers*, 2003, 2625–2630.

A combination of adiabatic pre-reforming and auto-thermal reforming at steam-to-carbon ratios of 0.6 was found to be the best option to convert natural gas into liquid fuel by the Fischer–Tropsch process. This process was demonstrated in pilot scale and industrial scale, and the adiabatic pre-reformer was capable for the conversion of natural gas at this low steam-to-carbon ratio without formation of coke. The high flexibility of the auto-thermal reforming to produce synthesis gas from various feedstocks was demonstrated.

04/01787 Catalytically active supercritical fluid to accelerate methanol synthesis

Reubroycharoen, P. *et al. Fuel*, 2003, 82, (18), 2255–2257.

Supercritical phase 2-butanol significantly increased the conversion of methanol synthesis from syngas not only by the conventional promotion effect of supercritical fluid but also by the catalytic effect of 2-butanol solvent itself, breaking through the thermodynamic limitation of this reaction effectively.

04/01788 Precise measurement of density of coal tar oil and liquid binder pitch

Yoon, K. *et al. Light Metals*, 2003, 503–507.

The density of liquid pitch is an essential factor for the mass of the pitch amount at elevated temperature. To operate an anode plant at optimum conditions, accurate weight measurement of liquid binder pitch is very important. However, there has been no adequate system to measure the precise density at high temperature and little data exist. The conventional density measurement system of buoyant force was modified to a system with a high-temperature measuring cell, which could measure the liquid density at high temperature with very high accuracy. Using this system, the high temperature densities of coal tar fractions were measured. Also densities of various coal tar binder pitches were measured in the temperature range of 190–210°, where liquid pitch is practically handled. These high temperature densities were then correlated with their typical properties.

04/01789 Selective removal of oxygen from syngas in production of liquid hydrocarbons

Wang, D. *et al. U.S. Pat. Appl. Publ. US 2003 153,632 (Cl. 518–703; C07C27/06)*, 14 Aug 2003, US Appl. PV353,774.

The invention described is an improvement in the preparation of liquid hydrocarbons from natural gas/methane, O and/or steam. In particular, it relates to processes for the production of synthesis gas, reducing the O concentration from the synthesis gas, and the production of liquid hydrocarbons using the O reduced synthesis gas as a feedstock. More particularly, the invention identifies catalyst compositions, apparatus and methods of using such catalysts and apparatus for preparing liquid hydrocarbons via O reduced synthesis gas.

04/01790 Solvent degradation during coal liquefaction in a flowing-solvent reactor

Li, W. *et al. Fuel*, 2004, 83, (2), 157–179.

It has been previously observed that primary coal extracts recovered from the flowing solvent reactor appeared to be of large molecular mass. Short residence times in the reaction zone following the solubilization of the extracts tended to limit their thermal degradation. This observation offered the vista of detailed characterization and analysis of most (≈80–90%) of the coal mass in solution, and in a state relatively free of thermal degradation. Point of Ayr coal was extracted with tetralin and with non-donor solvents, quinoline and NMP at 350 and 450°C. Structural evaluations have been carried out using size exclusion chromatography, UV–fluorescence spectrometry, GC–MS and probe-MS. Little coal-derived material could be found in the pentane-soluble part of the reaction mixture; solvent dimers and

trimers were prominent and coal-derived components, such as alkanes, were only minor components. In attempting to characterize the main, pentane-insoluble fraction of the coal extract, the level of interference from solvent-derived material emerged as the decisive parameter for the success or failure of the general method. However, the predominantly pentane-insoluble coal extracts from each solvent were contaminated by solvent polymerization products. For all three solvents, the level of contamination of extracts with solvent derived material tended to interfere with the detailed characterization/analysis of material extracted from the coal.

04/01791 Sorbent for removing crude oil and petroleum products from water and ground surface and preperation from brown coal

Ol'shanskii, V. O. *Russ. Ru 2,199,385 (Cl. B01J20/20)*, 27 Feb 2003, Appl. 2,001,110,304. (In Russian)

The sorbent contains 70–85% steam- and UV-treated ground brown coal, 0.1–0.2% OP-7 and OP-4 as surfactant, and 3.0–20% Aerosil. More particularly, brown coal is first subjected to primary grinding to fineness at least 1 mm and then treated anaerobically with overheated steam at 105–110° under simultaneous UV irradiation for 30 min, carbonized at 280–340° until volatile components are completely released, and reground to fineness 0.5–100 μ while simultaneously adding the silica powder and surfactants. The method produces environmentally safe sorbents with high sorption capacity (1.5–3.0 times their weight) for gasoline, light diesel fuel, mineral oils, and petroleum, as well as low density. The sorbents may be used in petroleum production, transport by sea of petroleum and petroleum products, and related industries.

04/01792 Trace-element partitioning between fractions of coal liquids during column chromatography and solvent separation

Herod, A. A. *et al. Energy & Fuels*, 2003, 17, (4), 862–873.

A coal tar pitch, a coal liquefaction extract, and a low-temperature coal tar have been fractionated by molecule mass, using column chromatography, and the fractions have been analysed for trace-element content. The solvents used for sequential extraction were acetonitrile, pyridine, and 1-methyl-2-pyrrolidinone (NMP). Trace elements were detected by inductively coupled plasma-mass spectroscopy (ICP-MS) after digestion of the liquids and fractions in a microwave bomb, using nitric acid and hydrogen peroxide. The mercury content was detected using a Leco model AMA254 analyser. The larger portion of the trace elements analysed have been found to associate preferentially with fractions that have been shown by size exclusion chromatography to contain the largest molecules. Some of the largest-molecule-mass material adhered to the silica that was used for fractionations. Trace-element mass balances for fractions separated by column chromatography were very poor, because of higher concentrations of trace elements in the largest organic molecules that were held onto the silica. One of the sample, the coal tar pitch, was fractionated by solvent solubility, without contact with filtration media. The method led to somewhat less-sharp molecule-mass separations; however, trace-element analyses of these fractions gave much-improved mass balances. Structural data from this work and previous characterizations suggest that, within larger molecules, increasingly large polycyclic aromatic (PCA) ring systems are being held together by a variety of aliphatic and alicyclic bridging structures. In the absence of mineral matter of other solids, it is thought that the high trace-element concentrations represented organic associations with these complex molecules.

04/01793 Utilization and future prospect of diesel fuel regenerated from waste food oil

Yamane, K. *Gekkan Haikibutsu*, 2003, 29, (2), 4–9. (In Japanese)

A review of the title subject, including waste food oil recycling as biomass and engine performance and exhaust properties of biodiesel fuels.

03 GASEOUS FUELS

Sources, properties, recovery, treatment

04/01794 Gasoline composition determined by ¹H NMR spectroscopy

Burri, J. *et al. Fuel*, 2004, 83, (2), 187–193.