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1 Editorial Board

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Review Articles

2 Transesterification of vegetable oil into biodiesel catalyzed by CaO: A review

Review Article

Pages 1-12

Masato Kouzu, Jyu-suke Hidaka

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3 A study of methodologies for CO₂ storage capacity estimation of saline aquifers

Review Article

Pages 13-27

P.N.K. De Silva, P.G. Ranjith

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Highlights

- Characteristics of CO₂ storage capacity estimation in saline aquifers are discussed. ► Effects of in situ properties on CO₂ storage capacity are explained. ► Methodologies for estimating CO₂ retention capacity in saline aquifers are compared. ► Mechanisms of increasing CO₂ storage potential are suggested.

Full Length Articles

4 Experimental and theoretical study of the combustion of *n*-triacontane in porous media

Original Research Article

Pages 28-36

F.B.J. Monmont, D.E.A. Van-Odyck, N. Nikiforakis

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articles 1 - 91

Highlights

- Measure oxidation of *n*-triacontane with a thermo micro-balance. ► Study the combustion of *n*-triacontane inside a porous medium. ► Model the combustion of *n*-triacontane with a newly developed thermal solver. ► Compare the experimental results against our model.

5 Conversion of rice straw into valuable products by hydrothermal treatment and steam gasification

Original Research Article

Pages 37-43

Kenji Murakami, Kengo Kasai, Takahiro Kato, Katsuyasu Sugawara

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Highlights

► The two-stage processing was performed to obtain valuable products from rice straw. ► The first stage is hydrothermal treatment and the second is steam gasification. ► We could obtain 4.5 wt.% (C basis) of monosaccharides in the first stage. ► Simultaneously, acids, furfural, and other water-soluble products were also formed. ► The residue yielded 60 mmol/g of hydrogen by loading nickel in the second stage.

- 6   **Development of data-driven models for fluidized-bed coal gasification process** Original Research Article
Pages 44-51
P.D. Chavan, T. Sharma, B.K. Mall, B.D. Rajurkar, S.S. Tambe, B.K. Sharma, B.D. Kulkarni
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- 7   **Flame structure investigations of oxy-fuel combustion** Original Research Article
Pages 52-58
Sivaji Seepana, Sreenivas Jayanti
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Highlights

► Flame structure evaluation for oxy-methane flame using full reaction mechanism. ► Identification of important intermediate reactions in oxy-methane flames. ► Elucidation of the effect of strain rate and dilution on oxygen leakage. ► Comparative study of flame stability between air–methane and air-oxy flames.

- 8   **Modeling of asphaltene precipitation utilizing Association Equation of State** Original Research Article
Pages 59-66
Babak Shirani, Manouchehr Nikazar, Ali Naseri, Seyyed A. Mousavi-Dehghani
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Highlights

► In this work, Association EOS was used for modeling of asphaltene precipitation. ► The model results were compared to other models and experimental data of 3 oil samples. ► The model results are in good agreement with experimental data. ► The effect of CO₂ injection was investigated for oil samples. ► Results show that increasing CO₂ content will increase asphaltene deposition.

- 9   **Passive control of premixed lifted flame in a dump combustor** Original Research Article
Pages 67-74
N.P. Yadav, A. Kushari
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Highlights

► Experimental study to elucidate passive control of premixed lifted flame in a dump combustor. ► The combustor geometry allowed a stable flame beyond the blow off limit. ► The heat release from the flame did not respond to the standing wave frequencies. ► Passive control of combustion oscillations achieved by inserting a slender rod.

- 10   **Experimental studies of flame extinction in a swirl-stabilized oxy-fuel burner** Original Research Article
Pages 75-81
Sivaji Seepana, Sreenivas Jayanti
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Highlights

► Experimental data of co-axial swirl-stabilized diffusion flames under oxy-fuel conditions. ► Investigation of the lower limits for extinction of the oxy-fuel flame which is of interest. ► Investigation of the effect of swirl stabilization of the oxy-fuel flame which is also interest.

- 11   **Alkaline in situ ethanolysis of *Jatropha curcas*** Original Research Article
Pages 82-85
M. Surya Abadi Ginting, M. Tazli Azizan, Suzana Yusup
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Highlights

► We study in situ ethanolysis of *Jatropha curcas* using base-catalysts. ► The reaction reaches equilibrium condition within 2 h using sodium-base catalyst. ► Maximum conversion is obtained at catalyst concentration of 2 wt.% except KOH. ► Biodiesel yield does not

significantly affected by increasing reaction temperature. ► Sodium methoxide promotes the reaction faster than that of NaOH and KOH.

12 

Deep desulfurization of diesel fuel by selective adsorption over Ni/Al₂O₃ and Ni/ZSM-5 extrudates

Original Research Article

Pages 86-91

K.K. Sarda, A. Bhandari, K.K. Pant, Sapna Jain

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Highlights

► Refractory sulfur compounds from commercial diesel were removed by adsorption. ► Ni/Al₂O₃ adsorbents resulted in higher sulfur removal as compared to Ni/ZSM-5 adsorbents. ► More than 90% S could be removed by 10% Ni/Al₂O₃ in the presence of H₂O₂. ► Column experiments were performed to investigate the kinetics of adsorption break through curves.

13 

Theoretical investigation on pyrolysis mechanism of glycerol

Original Research Article

Pages 92-98

Zhongfeng Geng, Minhua Zhang, Yingzhe Yu

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Highlights

► Glycerol was selected as a model compound for carbohydrate. ► Pyrolysis mechanisms were studied via Quantum Chemistry Calculation base on DFT. ► C-2 of glycerol preferred to be aldehyde group carbon atom in produced acetaldehyde. ► Cyclic Grob Fragmentation was the most possible channel for glycerol pyrolysis. ► Rate constant for the most possible channel was $2.29 \times 10^2 \text{ s}^{-1}$ at 1000 K.

14 

Effect of weathering on the mobility of zinc in municipal solid waste incinerator bottom ash

Original Research Article

Pages 99-104

Jun Yao, Wen-Bing Li, Qingna Kong, Fangfang Xia, Dong-Sheng Shen

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Highlights

► Weathering treatment can change the fractionation of Zn in MSWI bottom ash and increase its potential leaching. ► Zn leaching decreases in SPLP procedure but increases in TCLP procedure due to the weathering treatment. ► The decreasing of the Zn leaching in SPLP procedure can be attributed to the increase of aluminum (hydr)-oxides.

15 

Evaluation of alumina-supported Mo carbide produced via propane carburization for the Fischer–Tropsch synthesis

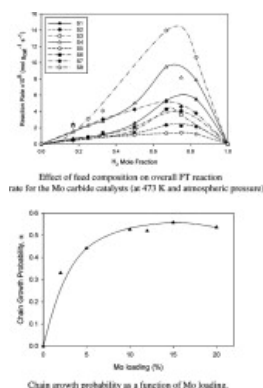
Original Research Article

Pages 105-116

Dai-Viet N. Vo, Cyrus G. Cooper, Tuan-Huy Nguyen, Adesoji A. Adesina, Dragomir B. Bukur







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Highlights

► Carburization 5H₂:1C₃H₈ gave lower acid site strength but improved synthesis rate. ► Solid-state kinetics was captured by a contracting volume model. ► Active site on the Mo carbide may be formed in situ via an initial CO chemisorption.

16		Experimental investigation of an industrial scale black liquor gasifier. Part 2: Influence of quench operation on product gas composition Original Research Article Pages 117-129 Henrik Wiinikka, Per Carlsson, Magnus Marklund, Carola Grönberg, Esbjörn Pettersson, Marcus Lidman, Rikard Gebart Show preview Related articles Related reference work articles	Purchase
Highlights <p>► For high primary spray flows, chemical reactions in the quench are freeze. ► For low primary spray flows the water gas shift reaction alter the gas composition. ► For very high primary spray flows, CO₂ absorption can become significant.</p>			
17		Heating with energy saving alternatives to prevent biodeterioration of marine fuel oil Original Research Article Pages 130-135 J. Hua Show preview Related articles Related reference work articles	Purchase
Highlights <p>► The study examines practice for preventing fuel oil biodeterioration onboard ship. ► Above 50 °C, no microbes observed after incubation for 2 days. ► Most fungi are destroyed after 5-days incubation. ► Heat shock control microbe growth more effectively than common heating treatment.</p>			
18		Methane oxidation over Pd catalysts supported on binary Al₂O₃–La₂O₃ oxides prepared by the sol–gel method Original Research Article Pages 136-141 A. Barrera, S. Fuentes, G. Díaz, A. Gómez-Cortés, F. Tzompantzi, J.C. Molina Show preview Related articles Related reference work articles	Purchase
Highlights <p>► Lanthana in Pd catalysts supported on Al₂O₃ promotes the oxidation of CH₄ at lower temperatures. ► Highest S_{BET} and CH₄ conversion were obtained in the Pd catalyst with 6 wt% of lanthana. ► The presence of PdO and La₂O₃·xPdO phases were found in the catalysts.</p>			
19		Asphaltene biodegradation using microorganisms isolated from oil samples Original Research Article Pages 142-148 T. Tavassoli, S.M. Mousavi, S.A. Shojasodati, H. Salehizadeh Show preview Related articles Related reference work articles	Purchase
Highlights <p>► Twenty-five species isolated from oil and polluted soil samples of Dorood oilfield. ► The bacterial mixed culture growth, in a bioreactor was evaluated by CHN and FTIR. ► pH, salinity and asphaltene concentration by <i>B. lentus</i> were optimized using RSM. ► Biodegradation of asphaltene by the mixed culture of five bacteria was 48%. ► Kinetic study showed that the data of asphaltene biodegradation fit to Tessier model.</p>			
20		Numerical modeling of the combustion of densified wood under fixed-bed conditions Original Research Article Pages 149-159 J. Collazo, J. Porteiro, D. Patiño, E. Granada Show preview Related articles Related reference work articles	Purchase
Highlights <p>► We have developed a 3D transient model for the simulation of fixed bed biomass combustion. ► This model is compared with data obtained in an experimental combustor. ► The solid-gas interaction is solved within the model, allowing a deep interrelation between the phases. ► The strong dependence between reaction front propagation and bed stoichiometry is captured.</p>			
21		Influence of staged-air flow on flow characteristics in a scale model of a down-fired utility boiler with swirl burners: An experimental study Original Research Article Pages 160-166 Zhengqi Li, Subo Fan, Qunyi Zhu, Wei Su, Zhichao Chen, Yukun Qin Show preview Related articles Related reference work articles	Purchase

		Highlights <p>► We conduct cold airflow experiments in the small-scale furnace of a down-fired boiler. ► We study influence of staged-air flow on flow characteristics of the boiler in this model. ► The flame reach of the downward airflow was decreased with the ratio increased. ► A shallower reach is accompanied by a weaker mixing of vent and staged-air.</p>	
22		Determination of Ca, Mg, and Zn in biodiesel microemulsions by FAAS using discrete nebulization Original Research Article <i>Pages 167-171</i> Renata S. Amais, Edivaldo E. Garcia, Marcos R. Monteiro, Joaquim A. Nóbrega Show preview Related articles Related reference work articles	Purchase
		Highlight <p>► Discrete nebulization was used for microemulsion introduction by FAAS. ► Calcium, Mg and Zn were determined in biodiesel microemulsions. ► Sensitivities were improved and legislation requirements were reached.</p>	
23		Oil shale CFBC ash cementation properties in ash fields Original Research Article <i>Pages 172-180</i> T. Pihu, H. Arro, A. Prikk, R. Rootamm, A. Konist, K. Kirsimäe, M. Liira, R. Mötlep Show preview Related articles Related reference work articles	Purchase
		Highlights <p>► Less cementitious phases form in low temperature CFB combustion of Ca-rich oil shale. ► Weaker cementation is amplified by particle separation in hydraulic deposition. ► Hydraulic deposition of CFBC oil shale ash is not feasible at low ash-water ratios.</p>	
24		Influence of oxygenates on fine particle and regulated emissions from a diesel engine Original Research Article <i>Pages 181-188</i> Md. Nurun Nabi, Johan Einar Hustad Show preview Related articles Related reference work articles	Purchase
		Highlights <p>► We examined the effect of oxygenates on diesel particulates and regulated emissions. ► Compared to MGO, both oxygenates reduced particulates. ► Like particulates, AM particles were reduced with both oxygenates. ► Other emissions include CO, THC and smoke were reduced with the oxygenates. ► No significant changes were observed with both oxygenates.</p>	
25		A parametric study for specific fuel consumption of an intercooled diesel engine using a neural network Original Research Article <i>Pages 189-199</i> Abdullah Uzun Show preview Related articles Related reference work articles	Purchase
		Highlights <p>► Parametric study is executed to investigate on the engine specific fuel consumption. ► These data were used to enhance train and test a NN model using a MATLAB program. ► NN based model were found to be convincing by the experimental results.</p>	
26		Effect of asphaltenes on equilibrium and rheological properties of waxy model systems Original Research Article <i>Pages 200-212</i> Luis Alberto Alcazar-Vara, Jorge Alberto Garcia-Martinez, Eduardo Buenrostro-Gonzalez Show preview Related articles Related reference work articles	Purchase
		Highlights <p>► The effect of asphaltenes on wax crystallization and gelation is studied. ► Equilibrium and rheological properties were evaluated. ► Rheological behavior was significantly influenced by the presence of asphaltenes. ► Chemical nature of asphaltenes played an important role.</p>	
27		Kinetic study of fuel NO formation from pyrrole type nitrogen Original Research Article <i>Pages 213-220</i> Tsuyoshi Yamamoto, Takuya Kuwahara, Koichi Nakaso, Takahisa Yamamoto Show preview Related articles Related reference work articles	Purchase

Highlights

► The reaction mechanism of fuel NO formation from pyrrole have been investigated experimentally and numerically. ► Pyrrole is mainly converted into N₂ or NO by way of HCN. ► The main reaction pathways from pyrrole to HCN are direct reaction by pyrrole pyrolysis and pyrolysis reaction of HNCPROP. ► HCN is converted to N₂ or NO via NCO and about 90% of nitrogen in pyrrole is transformed to N₂ or NO.

28 **Optimization of ethanol production from thick juice: A response surface methodology approach**

Original Research Article
Pages 221-228
Jovana Grahovac, Jelena Dodić, Aleksandar Jokić, Siniša Dodić, Stevan Popov

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Highlights

► The course of thick juice fermentation in batch culture was analyzed. ► Parameters for modelling using response surface methodology were defined. ► Optimization of multiple responses was simultaneously performed. ► The optimal conditions are fermentation time of 46 h and initial sugar mass fraction of 20.67%. ► Obtained results were validate in the enlarged scale.

29 **Optimization of injection strategy to reduce fuel consumption for stoichiometric diesel combustion**

Original Research Article
Pages 229-237
Daesik Kim, Sungwook Park

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Highlights

► Optimization using genetic algorithm was performed to reduce fuel consumption. ► The optimized case includes 50–50% split injection, reduced spray included angle. ► This optimization yielded an 11.8% improvement in fuel consumption.

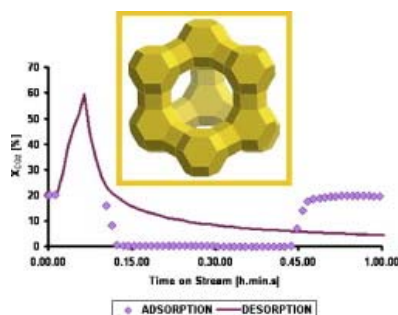
30 **Regenerability of zeolites as adsorbents for natural gas sweetening: A case-study**

Original Research Article
Pages 238-244
Marco Tagliabue, Caterina Rizzo, Nicola B. Onorati, Enrico F. Gambarotta, Angela Carati, Francesca Bazzano

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Highlights

► We have provided adsorption data over wide range conditions. ► We have shown correlations among zeolite adsorption features and their composition. ► Reported results are in agreement with previous studies on other adsorbents.

31 **Modeling of NH₃–NO–SCR reaction over CuO/γ-Al₂O₃ catalyst in a bubbling fluidized bed reactor using artificial intelligence techniques**







Original Research Article
Pages 245-251
Muhammad Faisal Irfan, Farouq S. Mjalli, Sang Done Kim






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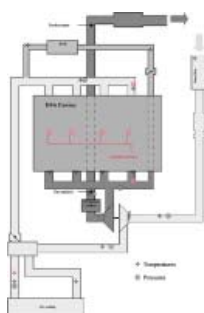
Highlights

► We study NH₃–NO–SCR process in a bubbling fluidized bed reactor. ► We compare mechanistic model with ANN on same experimental data. ► ANN predict well with all the data sets compared to mechanistic model.

32		Application of thermogravimetric analysis for thermal stability of <i>Jatropha curcas</i> biodiesel Original Research Article Pages 252-257 Siddharth Jain, M.P. Sharma Show preview Related articles Related reference work articles	Purchase
Highlights <p>► Application of thermogravimetric analysis for thermal degradation of <i>Jatropha curcas</i> is investigated in the present paper. ► The thermodynamic parameter of activation energy of the samples was determined by direct Arrhenius plot. ► The results show that the thermal degradation of all JCB samples can be treated as a first order reaction.</p>			
33		SO₂ capture and attrition characteristics of a CaO/bio-based sorbent Original Research Article Pages 258-263 Yuran Li, Haiying Qi, Jing Wang Show preview Related articles Related reference work articles	Purchase
Highlights <p>► A CaO/bio-based sorbent is developed with high calcium conversion and small attrition fraction. ► The biomass acts as a dispersion medium to prevent agglomeration of the lime particles. ► The biomass and lime produces hydrated calcium silicate. ► Biomass ash melting rearranges the lime structure. ► The small attrition fraction is related to the high SiO₂ and K₂O fractions in the biomass.</p>			
34		Self-healing of open cracks in asphalt mastic Original Research Article Pages 264-272 Álvaro García Show preview Related articles Related reference work articles	Purchase
Highlights <p>► We examine self healing of open cracks in asphalt mastic. ► We hypothesize that the main cause for healing is capillary flow of bitumen through the crack. ► We have related asphalt self healing rates through the Arrhenius equation.</p>			
35		The solid recovered fuel Stablat®: Characteristics and fluidised bed gasification tests Original Research Article Pages 273-283 G. Dunnu, K.D. Panopoulos, S. Karellas, J. Maier, S. Toulou, G. Koufodimos, I. Boukis, E. Kakaras Show preview Related articles Related reference work articles	Purchase
Highlights <p>► The solid recovered fuel Stablat® is examined for its fuel properties. ► The optimum gasification parameters were identified. ► Feeding problems were solved by grinding the fuel. ► No loss of fluidization occurred. ► The agglomerated particulates do not cause any problems.</p>			
36		Biodiesel production from soybean oil transesterification in subcritical methanol with K₃PO₄ as a catalyst Original Research Article Pages 284-287 Jian-Zhong Yin, Zhen Ma, Zi-Yang Shang, Da-Peng Hu, Zhi-Long Xiu Show preview Related articles Related reference work articles	Purchase
Highlights <p>► Laminar flame speeds and Markstein lengths of DMF-iso-octane-air mixtures are obtained. ► Flame stabilities of the mixtures are analyzed. ► Correlation of flame speeds versus pressure and temperature are provided.</p>			
37		Characterisation of boron-doped coal-derived carbon foams and their oxidation behaviour Original Research Article Pages 288-297 Elena Rodríguez, Roberto García Show preview Related articles Related reference work articles	Purchase
Highlights <p>► Graphitised carbon foams with improved resistance to oxidation are prepared by boron loading. ► Boron occupies substitutional positions in the graphitic layers. ► Boron clusters, boron carbide and BC₂O structures are also observed. ► At high B loadings, foams display higher temperature of oxidation.</p>			

- 38  **Measurement of nitrogen evolution in a staged oxy-combustion coal flame** Original Research Article
Pages 298-304
Andrew J. Mackrory, Dale R. Tree
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- Highlights**
- NO_x, HCN, and NH₃ measurements taken in staged air and oxy-combustion.
 - At a fixed S.R., oxy-combustion produced more NH₃, HCN, and CH₄ in the fuel rich zone.
 - Oxy-combustion produced minimum NO_x at fuel rich S.R. = 0.83, air at S.R. = 0.63.
 - NO_x in oxy-combustion is less sensitive to fuel rich zone S.R.
- 39  **A novel emulsifier for ethanol–diesel blends and its effect on performance and emissions of diesel engine** Original Research Article
Pages 305-311
Jilin Lei, Lizhong Shen, Yuhua Bi, Hong Chen
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- Highlights**
- A novel mixed emulsifier, named “CLZ”, was developed based on biofuel and castor oil.
 - With a CLZ emulsifier the ethanol–diesel blend E10 can keep its physical stability.
 - The use of ethanol–diesel blends with a CLZ improved the break thermal efficiency.
 - The smoke emission was reduced significantly and the NO_x emission decreased slightly.
- 40  **Oxidation, reemission and mass distribution of mercury in bituminous coal-fired power plants with SCR, CS-ESP and wet FGD** Original Research Article
Pages 312-318
Deepak Pudasainee, Jeong-Hun Kim, Young-Sik Yoon, Yong-Chil Seo
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- Highlights**
- Mercury speciation variations in flue gas at the inlet and outlet of various air pollution control devices.
 - Effect of temperature, flue gas flow rate, flue gas components (HCl, SO_x and NO_x) on mercury oxidation.
 - Mercury oxidation in SCR systems, reemission of Hg⁰ in a wet FGD and factors related to it.
 - Statistical analysis of the factors promoting co-beneficial control of mercury in coal-fired power plants.
 - Comparative mass distribution of mercury in SCR + CS-ESP + wet FGD and CS-ESP + wet FGD configuration and their implication.
- 41  **Formation kinetics of nitric oxide of a biodiesel surrogate relative to *n*-heptane under comparable oxygen equivalence ratio in a homogeneous reactor** Original Research Article
Pages 319-328
G.K. Rathore, T.J. Jacobs
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- Highlights**
- Objective: determine NO concentrations of a biodiesel surrogate and *n*-heptane.
 - Study conducted using a 0-D homogeneous reactor with available kinetics for fuels.
 - Study observes surrogate has lower oxygen consumption efficiency than *n*-heptane.
 - Fuel conversion percentages of surrogate components increase slower than *n*-heptane.
- 42  **Ethanol–biodiesel–Diesel fuel blends: Performances and emissions in conventional Diesel and advanced Low Temperature Combustions** Original Research Article
Pages 329-338
Ludivine Pidol, Bertrand Lecoite, Laurie Starck, Nicolas Jeuland
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Graphical abstract



Highlights

► The behavior of ethanol blended fuels is studied in Diesel and Low Temperature Combustion. ► The weak ignitability of the ethanol blends requires an engine settings optimization. ► High oxygen content of such fuels allows smoke levels and NO_x emissions reductions. ► These fuels lead to an extended LTC operating range and improved maximum power output.

- 43  **Evaluation of chemical-kinetics models for *n*-heptane combustion using a multidimensional CFD**

codeOriginal Research Article

Pages 339-350

Viswanath R. Katta, Suresh K. Aggarwal, William M. Roquemore

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- 44  **Testing of minerals and industrial by-products as oxygen carriers for chemical-looping combustion in a circulating fluidized-bed 300 W laboratory reactor**

Original Research Article

Pages 351-363

Patrick Moldenhauer, Magnus Rydén, Anders Lyngfelt

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Highlights

► Over 85 h of continuous operation with ilmenite oxygen carrier; high but incomplete fuel conversion. ► Iron oxide scale (IOS) oxygen-carrier experiments were conducted for 37 h with moderate fuel conversion. ► Problems with IOS particles were particle agglomeration and high attrition rate. ► Both tested oxygen carriers are suitable for use in chemical-looping combustion though with some drawbacks.

- 45  **Reduction in emissions of nitrogen oxides, particulate matter, and polycyclic aromatic hydrocarbon by adding water-containing butanol into a diesel-fueled engine generator**

Original Research Article

Pages 364-372

Sheng-Lun Lin, Wen-Jhy Lee, Chia-fon F. Lee, Yo-ping Wu

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Highlights

► No surfactant demand to stabilize 0.5 and 1.0 wt.% water in butanol–diesel blends while butanol acts as a stabilizer. ► A small amount of water (0.5 wt.%) in butanol–diesel blend can solve the dilemma between NO_x and PM emissions. ► PAHs and BaP_{eq} can be effectively reduced by using 0.5 wt.% water-containing butanol–diesel blends. ► The acceptance of water content in butanol–diesel blends supports a simpler production of butanol additive.

- 46  **A single step non-catalytic esterification of palm fatty acid distillate (PFAD) for biodiesel production**

Original Research Article

Pages 373-380


Hyun Jun Cho, Soo Hyun Kim, Seok Won Hong, Yeong-Koo Yeo

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Highlights

► The single step method for non-catalytic esterification of PFAD. ► The conditions which make the reaction completed within 180 min with no catalyst. ► The effects of temperature, methanol feed rate and pressure on a semi-batch reaction. ► The results of kinetic study on the reaction, activation energy and frequency factor.

- 47  **Determination of sodium and potassium in biodiesel by flame atomic emission spectrometry, with dissolution in ethanol as a single sample preparation step**

Original Research Article

Pages 381-384

Ariane Isis Barros, Adriana P. de Oliveira, Márcia R.L. de

Magalhães, Ricardo D. Villa

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Highlights

► Na and K were determined in biodiesel by FAES. ► Dissolution in ethanol was used as single sample preparation step. ► Inorganic aqueous standards were employed in the calibration method. ► The method meets legislative requirements for quality control of biodiesel.

- 48  **Reversible removal of SO₂ at low temperature by L- α -alanine supported on γ -Al₂O₃**

Original Research Article

Pages 385-390

Renpan Deng, Lishan Jia

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Highlights

► L- α -Alanine supported on γ - Al_2O_3 as desulfurization adsorbent. ► The adsorbent exhibited an excellent activity on SO_2 removal. ► Water vapor promoted SO_2 removal and low temperature was conducive for the process. ► SO_2 adsorbed on the adsorbent via weak and strong adsorption. ► The adsorbent had an excellent regeneration performance.

49 **Effect of the test temperature and anti-oxidant addition on the oxidation stability of commercial biodiesel fuels**

Original Research Article

Pages 391-396

M. Lapuerta, J. Rodríguez-Fernández, Á. Ramos, B. Álvarez

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► Increasing test temperature, now fixed at 110 °C, maintaining induction period, is not viable. ► At high temperature the accuracy of measurements is reduced by additive evaporation. ► At high temperature, achieving induction period limit would imply using huge amount of additive. ► The previous use of the oil for frying processes reduced the stability of final fuel.

50 **Experimental reconstructions of flame temperature distributions in laboratory-scale and large-scale pulverized-coal fired furnaces by inverse radiation analysis**

Original Research Article

Pages 397-403

Dong Liu, Jianhua Yan, Fei Wang, Qunxing Huang, Yong Chi, Kefa Cen

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► Temperature distributions in pulverized-coal fired furnaces were reconstructed. ► The reconstruction technique uses CCD cameras by the inverse radiation analysis. ► Reconstructed temperature distributions can reproduce the actual main features. ► This technique has a good ability of on-line reconstruction and monitoring.

51 **Experimental studies and molecular modelling of catalytic steam gasification of brown coal containing iron species**

Original Research Article

Pages 404-414

G. Domazetis, B.D. James, J. Liesegang, M. Raoarun, M. Kuiper, I.D. Potter, D. Oehme

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► XPS data of catalytic steam gasification of char shows oxygen from steam is distributed as inorganic and organic. ► Higher loadings of polynuclear iron hydroxyl-species lead to greater conversion of char substrate. ► QM-SE molecular modelling data are consistent with experimental results. ► Concerted reaction mechanisms are energetically favoured over discreet mechanisms.

52 **Electrocatalytic hydrogenation of aromatic compounds in ionic liquid solutions over WS_2 -on-glassy carbon and Raney nickel cathodes**

Original Research Article

Pages 415-422

Andrey Tsyganok, Christopher M. Holt, Sean Murphy, David Mitlin, Murray R. Gray

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► Aromatics were electro-catalytically hydrogenated in ionic liquid at ambient T and P. ► WS_2 catalytic electrode was active in the presence of sulphur compound (thiophene). ► Naphthalene, quinoline and carbazole were hydrogenated. ► Current efficiencies for the WS_2 electrode were below 10% in all cases. ► Methyl naphthalene and benzothiophene were not hydrogenated.

53 **Low-temperature oxidation of some Turkish coals**

Original Research Article

Pages 423-432







K. Baris, S. Kizgut, V. Didari

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► Low-temperature oxidation of four Turkish coals was assessed. ► The formation rates of CO and CO_2 and the CO/ CO_2 ratio was tracked. ► Temperature has a pronounced effect on

		the formation rates. ► High rank coals were oxidized rapidly than low rank coals. ► The coal having the highest inertinite group macerals had the highest CO ₂ and CO production rates.	
54		<p>Mechanical/thermal dewatering of lignite. Part 4: Physico-chemical properties and pore structure during an acid treatment within the MTE processOriginal Research Article <i>Pages 433-442</i> Christian Vogt, Thomas Wild, Christian Bergins, Karl Strauß, Janine Hulston, Alan L. Chaffee</p> <p> Show preview Supplementary content  Related articles Related reference work articles</p>	<div>Purchase</div>
		<p>Highlights</p> <p>► Mechanical Thermal Expression (MTE) dewatering of lignite. ► Alkali cation removal by acid treatment. ► Pore volume reduction with increasing MTE process severity. ► Moisture holding capacity correlates with pore volume in MTE products. ► Physical properties of MTE products are not differently influenced by acid versus water treatment.</p>	
55		<p>Comparative evaluation of immiscible, near miscible and miscible CO₂ huff-n-puff to enhance oil recovery from a single matrix–fracture system (experimental and simulation studies)Original Research Article <i>Pages 443-453</i> F. Torabi, A. Qazvini Firouz, A. Kavousi, K. Asghari</p> <p> Show preview Related articles Related reference work articles</p>	<div>Purchase</div>
		<p>Highlights</p> <p>► In this study we examined the applicability of CO₂ based huff-and-puff to fractured reservoirs. ► We performed a numerical simulation to history match the experimental results obtained. ► Effects of key parameters on the performance of CO₂ based huff-and-puff are examined. ► It was concluded that injecting CO₂ at supercritical condition is the most viable option for EOR.</p>	
56		<p>Fuel and diluent property effects during wet compression of a fuel aerosol under RCM conditionsOriginal Research Article <i>Pages 454-467</i> S.S. Goldsborough, M.V. Johnson, G.S. Zhu, S.K. Aggarwal</p> <p> Show preview Supplementary content  Related articles Related reference work articles</p>	<div>Purchase</div>
		<p>Highlights</p> <p>► Wet compression model used to study vaporization of fuels under aerosol RCM conditions. ► Five hydrocarbons of increasing molecular size, and three diluent gases are investigated. ► Fuel boiling curve and vaporization enthalpy are most sensitive fuel properties. ► Diluent gas heat capacity and molar mass are most sensitive diluent gas properties. ► Hydrocarbons as large as <i>n</i>-hexadecane appear to be candidates for aerosol RCM experiments.</p>	
57		<p>Transesterification mechanism of soybean oil to biodiesel catalyzed by calcined sodium silicateOriginal Research Article <i>Pages 468-472</i> Feng Guo, Ning-Ning Wei, Zhi-Long Xiu, Zhen Fang</p> <p> Show preview Related articles Related reference work articles</p>	<div>Purchase</div>
		<p>Highlights</p> <p>► The mechanistic route of the transesterification catalyzed with calcined sodium silicate (CSS) was firstly elucidated. ► Density functional theory were employed to deduce the mechanism of transesterification reactions catalyzed with CSS. ► The alkaline active species of CSS were formed from the ion-exchange between CSS and CH₃OH. ► A simple method was used to regenerate the catalyst that performed good activity and reproducibility.</p>	
58		<p>Production of hydrogen-rich syngas from steam gasification of blend of biosolids and wood using a dual fluidised bed gasifierOriginal Research Article <i>Pages 473-478</i> Woei Saw, Hamish McKinnon, Ian Gilmour, Shusheng Pang</p> <p> Show preview Related articles Related reference work articles</p>	<div>Purchase</div>
		<p>Highlights</p> <p>► Syngas produced from steam gasification of pure biosolids had higher content of H₂ compared with that from pure wood. ► Syngas, H₂ yields and cold gas efficiency in steam gasification decreased dramatically for 100% biosolids. ► Addition of 10–20% loading biosolids in the fuel did not diminish the yields and the efficiency. ► H₂ and CO concentrations using steam were found to be 40% higher than for those using other gasification agents.</p>	

59			Kinetic investigation on the smouldering combustion of boreal peat Original Research Article Pages 479-485 Dominique Cancellieri, Valérie Leroy-Cancellieri, Eric Leoni, Albert Simeoni, Alexander Ya. Kuzin, Alexander I. Filkov, Guillermo Rein  Show preview Related articles Related reference work articles	Purchase
Highlights <p>► TGA experiments were performed on various kinds of boreal peats. ► Correlation between thermal behaviour and botanical/chemical composition was established. ► Isoconversional method was applied on thermogravimetric data. ► Solid temperature was calculated using an algorithm.</p>				
60			Cogasification of sewage sludge in an updraft gasifier Original Research Article Pages 486-491 M. Seggiani, S. Vitolo, M. Puccini, A. Bellini  Show preview Related articles Related reference work articles	Purchase
Highlights <p>► Cogasification of sewage sludge with wood pellets is studied in a updraft gasifier. ► The effects of equivalent ratio (0.15–0.25) and sewage sludge content are examined. ► The rise of the equivalent ratio leads to higher gas yields and cold gas efficiencies. ► Sewage sludge addition up to 70 wt.% reduces moderately the process performance. ► At high sewage sludge content (□70 wt.%) slagging and clinker formation occur.</p>				
61			The autoignition of practical fuels at HCCI conditions: High-pressure shock tube experiments and phenomenological modeling Original Research Article Pages 492-501 A. Vandersickel, M. Hartmann, K. Vogel, Y.M. Wright, M. Fikri, R. Starke, C. Schulz, K. Boulouchos  Show preview Related articles Related reference work articles	Purchase
Highlights <p>► Measured shock tube ignition delays for heptane and two kerosenes. ► Both kerosenes contain e.g. aromatics and cyclo-alkanes. ► Conditions tailored to those found in HCCI engines (lean, high EGR). ► Arrhenius correlation successfully describes first stage and main ignition delays. ► Correlation between fuel composition and ignition behavior identified.</p>				
62			Antioxidants loss kinetics in polyethylene exposed to model ethanol based biofuels Original Research Article Pages 502-509 Fatma Djouani, Bhavesh Patel, Emmanuel Richaud, Bruno Fayolle, Jacques Verdu  Show preview Related articles Related reference work articles	Purchase
Highlights <p>► Biofuel influence on residual oxidative stability of automotive PE tanks is highlighted. ► Extraction kinetics is modeled. ► Stabilizers that are added to PE are compared in term of extractibility.</p>				
63			Fast-cycling VPSA for hydrogen purification Original Research Article Pages 510-523 Filipe V.S. Lopes, Carlos A. Grande, Alírio E. Rodrigues  Show preview Related articles Related reference work articles	Purchase
64			Effect of regulated harmful matters from a heavy-duty diesel engine by H₂/O₂ addition to the combustion chamber Original Research Article Pages 524-527 Hsin-Kai Wang, Chia-Yu Cheng, Kang-Shin Chen, Yuan-Chung Lin, Chung-Bang Chen  Show preview Related articles Related reference work articles	Purchase
Highlights <p>► The brake thermal efficiency is increased for 70 L/min of H₂/O₂ addition. ► The fuel consumption is reduced for 50–70 L/min of H₂/O₂ addition. ► The emissions of HC, CO, and CO₂ were reduced due to improved combustion and the absence of carbon in hydrogen fuel. ► The emission of NO_x was increased due to high temperature and oxygen present in the fuel mixture.</p>				

65		Production and evaluation of hydrocarbon oil from co-deoxy-liquefaction of waste lard and locust leaves Original Research Article Pages 528-532 Yigang Chen, Shipeng Guo, Chao Wang, Fan Yang, Zhengyu Yang Show preview Related articles Related reference work articles	Purchase
Highlights <ul style="list-style-type: none"> ► At 450 °C, 69.8% alkanes were detected with the lowest oxygen content of 1.4%. ► More saturated fatty acids and extractives favored formation of more alkanes. ► Nitrogen of locust leaves was partly converted into nitrogen gas. ► Preparation of hydrocarbon oil was highly related to biomass feedstock. 			
66		Performance of Ce_{0.25}Zr_{0.75}O₂ promoted Pd/Ag/γ-Al₂O₃ catalysts for low-temperature methanol oxidation Original Research Article Pages 533-538 Yongjin Luo, Yihong Xiao, Guohui Cai, Yong Zheng, Kemei Wei Show preview Related articles Related reference work articles	Purchase
Highlights <ul style="list-style-type: none"> ► Ce_{0.25}Zr_{0.75}O₂ modified Pd/Ag/γ-Al₂O₃ catalysts towards methanol oxidation were examined. ► The markedly enhanced activity attaining the light-off temperature near 85 °C was achieved. ► Ce_{0.25}Zr_{0.75}O₂ favors more active sites: metallic Ag clusters and high oxidation Pd. ► The promotion is due to the co-effects of texture properties and characteristic properties. 			
67		Liquid length and vapor penetration of conventional, Fischer–Tropsch, coal-derived, and surrogate fuel sprays at high-temperature and high-pressure ambient conditions Original Research Article Pages 539-548 Sanghoon Kook, Lyle M. Pickett Show preview Related articles Related reference work articles	Purchase
Highlights <ul style="list-style-type: none"> ► High fuel boiling point and fuel density increases liquid penetration length due to mixing-limited vaporization. ► Fuel density does not affect vapor penetration and hence total entrainment. ► Fuel density and boiling point do not affect the mixing into the spray. 			
68		Impacts of ethanol fuel level on emissions of regulated and unregulated pollutants from a fleet of gasoline light-duty vehicles Original Research Article Pages 549-558 Georgios Karavalakis, Thomas D. Durbin, Manish Shrivastava, Zhongqing Zheng, Mark Villela, Heejung Jung Show preview Related articles Related reference work articles	Purchase
Highlights <ul style="list-style-type: none"> ► THC, NMHC, and CO emissions generally decreased with ethanol, except E85 blend. ► NO_x emissions increased with increasing ethanol content for the older vehicles. ► For the newer vehicles the ethanol blends generally had lower NO_x emissions. ► Strong increases for carbonyl emissions with ethanol, especially formaldehyde and acetaldehyde for E85. ► BTEX and 1,3-butadiene emissions decreased with increasing ethanol. 			
69		Water content, temperature and biocide effects on the growth kinetics of bacteria isolated from JP-8 aviation fuel storage tanks Original Research Article Pages 559-566 Vassilios Raikos, Sotiris S. Vamvakas, Dimitrios Sevastos, John Kapolos, George Karaiskakis, Athanasia Koliadima Show preview Related articles Related reference work articles	Purchase
Highlights <ul style="list-style-type: none"> ► JP-8 fuel was found to support microbial growth. ► The growth profile of each isolate is enhanced by increased temperature. ► Kathon FP 1.5 (100 ppm) was found to suppress drastically bacterial growth. 			
70		Effects of pyrolysis conditions on the heating rate in biomass particles and applicability of TGA kinetic parameters in particle thermal conversion modelling Original Research Article Pages 567-575 Ramin Mehrabian, Robert Scharler, Ingwald Obernberger Show preview Related articles Related reference work articles	Purchase

Highlights

► Heating rate during pyrolysis is inversely proportional to the thermal time constant and independent of the Biot number. ► If $\tau > 50$ s, pyrolysis occurs in a low heating rate regime. ► Pyrolysis of wood dust and wood pellets always happen in high heating rate regimes. ► Pyrolysis of wood logs always occurs in low heating rate regimes. ► Wood chips pyrolysis undergo low or high heating rate regimes depending on their size.

71



Effects of simultaneous ultrasonic treatment on flotation of hard coal slimes

Original Research Article

Pages 576-580

Safak Gokhan Ozkan

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Graphical abstract



Highlights

► Ultrasonic treatment improved flotation conditions of coal samples. ► The reagent consumption drastically decreased by use of ultrasound. ► The ash content of the floated coal seems to be not decreased by use of ultrasound. ► Ultrasonic treatment increased combustible recovery values of floated coal.

72



Dissolution of refractories for gasification process of petroleum coke for the steel industry

Original Research Article

Pages 581-588

R. Puente-Ornelas, C.J. Lizcano-Zulaica, A.M. Guzmán, P.C.

Zambrano, T.K. Das-Roy

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Highlights

► $MgAl_2O_4$ and Al_2O_3 refractories were designed for petroleum coke gasification process in steel industry. ► Refractories were exposed to petroleum coke ashes and exhibited dissolution due to molten slag penetration. ► Microstructural analysis revealed formation of spinel's type $(Ni^{2+}, Fe^{2+} \text{ and } Mg^{2+})IV (Al^{3+}, Fe^{3+})VI_2O_4$. ► Hibonite and gehlenite phases were also observed. ► These phases together help to stop the molten slag penetration.

73



High-temperature entrained flow gasification of biomass

Original Research Article

Pages 589-600

Ke Qin, Weigang Lin, Peter Arendt Jensen, Anker Degn Jensen

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Highlights

► Biomass gasification was studied in an entrained flow reactor at high temperature. ► Biomass was completely converted at all applied operating conditions. ► At 1350 °C, $\lambda = 0.35$, and $H_2O/C = 1$, a tar-free syngas with low soot yield is obtained. ► Wood and straw gasification provided similar product compositions. ► At 1350 °C with steam addition, the syngas composition is close to equilibrium.

74



Low temperature behavior of poultry fat biodiesel:diesel blends

Original Research Article

Pages 601-605

E.F.S.M. Ramalho, J.R. Carvalho Filho, A.R. Albuquerque, S.F. de

Oliveira, E.H.S. Cavalcanti, L. Stragevitch, I.M.G. Santos, A.G.

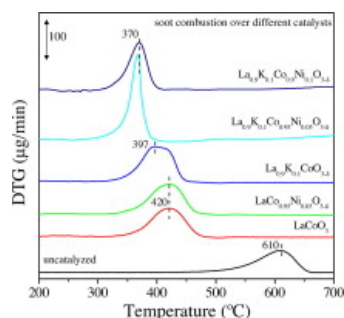
Souza

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Highlights

► CP and the CFPP were related to the first crystallization peak of the MT-DSC. ► PP values were close to the second crystallization peak temperature. ► PP values are not related to the complete solidification of the fuel.

- 75   **Performance of K and Ni substituted $\text{La}_{1-x}\text{K}_x\text{Co}_{1-y}\text{Ni}_y\text{O}_{3-\delta}$ perovskite catalysts used for soot combustion, NO_x storage and simultaneous NO_x -soot removal** Original Research Article
Pages 606-610
Zhaoqiang Li, Ming Meng, Fangfang Dai, Tiandou Hu, Yaning Xie, Jing Zhang
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- $\text{La}_{1-x}\text{K}_x\text{Co}_{1-y}\text{Ni}_y\text{O}_{3-\delta}$ show better performance for soot combustion and soot- NO_x removal.
- More Co^{4+} ions and oxygen vacancies are formed in $\text{La}_{1-x}\text{K}_x\text{Co}_{1-y}\text{Ni}_y\text{O}_{3-\delta}$ catalysts.
- Substituted catalysts $\text{La}_{1-x}\text{K}_x\text{Co}_{1-y}\text{Ni}_y\text{O}_{3-\delta}$ possess larger amount of adsorbed oxygen.
- Soot combustion activation energy is largely decreased by simultaneous substitution.

- 76   **Emission characteristics of a spark-ignition engine fuelled with gasoline-*n*-butanol blends in combination with EGR** Original Research Article
Pages 611-617
Xiaolei Gu, Zuohua Huang, Jian Cai, Jing Gong, Xuesong Wu, Chia-fon Lee
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- Gasoline-butanol blends decrease engine specific HC CO, NO_x and PM emissions.
- EGR reduces specific NO_x emissions and PM number concentration in gasoline-butanol SI engine.
- Advancing spark timing increases specific HC, NO_x and PM emissions.

- 77   **XAFS characterization of mercury captured on cupric chloride-impregnated sorbents** Original Research Article
Pages 618-624
Xin Li, Joo-Youp Lee, Steve Heald
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- Little or no elemental mercury was found from raw, CuCl_2 -, and HCl-doped AC sorbents.
- HgCl_2 is formed as a result of the reaction between $\text{Hg}(0)$ vapor and CuCl_2 .
- HgS is likely to be formed when $\text{Hg}(0)$ vapor is adsorbed onto Norit DARCO-HG.

- 78   **Chemical kinetic mechanism and a skeletal model for oxidation of *n*-heptane/methanol fuel blends** Original Research Article
Pages 625-631
Hanjun Xu, Chunde Yao, Guanglan Xu
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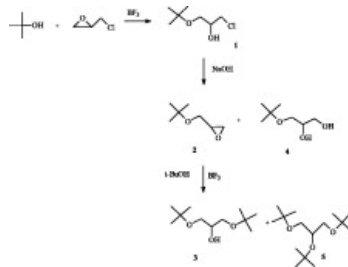
- The inhibit effect of methanol on the ignition of diesel (*n*-heptane) is analysed.
- A skeletal model for the combustion process of pure fuel and blends is created.
- The model includes 38 reactions and 30 species.
- The model has been validated by experiment and detailed mechanism.

- 79   **A new route to synthesize *tert*-butyl ethers of bioglycerol** Original Research Article
Pages 632-637
Ana-María Al-Lal, Jerónimo-Emilio García-González, Alberto Llamas, Alfredo Monjas, Laureano Canoira
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Graphical abstract

Process for the synthesis of 1,3-di-*tert*-butoxypropan-2-ol from epichlorohydrin and *tert*-butanol.



80 **Catalyst evaluation for waste cooking oil hydroprocessing**

Original Research Article

Pages 638-641

Stella Bezergianni, Aggeliki Kalogianni, Athanasios Dimitriadis

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Highlights

► Catalytic hydroprocessing of waste cooking oil offers new renewable fuels. ► Hydrotreating catalysts are preferable for biodiesel vs. biogasoline production. ► Hydrotreating catalysts enable heteroatom removal (S, N, O) and saturation of double bonds.

81 **Improvement of cold filter plugging point of biodiesel from alternative feedstocks**

Original Research Article

Pages 642-648

Camelia Echim, Jeroen Maes, Wim De Greyt

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Highlights

► The CFPP was improved by admixture of different biodiesel feedstocks. ► The CFPP of biodiesel samples was improved by addition of cold flow improvers. ► The removal of free sterol glucosides from biodiesel did not influence the CFPP. ► The removal of monoglycerides from biodiesel did not improve the CFPP.

82 **Dynamic measurement of mercury adsorption and oxidation on activated carbon in simulated cement kiln flue gas**

Original Research Article

Pages 649-657

Yuanjing Zheng, Anker D. Jensen, Christian Windelin, Flemming Jensen

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Highlights

► This is the first published research on dynamic mercury measurement and control related to cement production. ► A commercial converter developed for waste incinerator applications does not work properly in simulated cement kiln flue gas. ► We have developed and optimized a sodium sulfite-based converter for cement plant application. ► Laboratory tests show that the developed converter is appropriate for dynamic measurements.

83 **PC-SAFT characterization of crude oils and modeling of asphaltene phase behavior**

Original Research Article

Pages 658-669

Sai R. Panuganti, Francisco M. Vargas, Doris L. Gonzalez, Anjushri S. Kurup, Walter G. Chapman

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Highlights

► This paper addresses the prediction of asphaltene precipitation at high pressure and temperature. ► The modeling is done using the Perturbed Chain form of the Statistical Associating Fluid Theory Equation of State. ► This manuscript describes the procedure followed to tune the simulation parameters to available data. ► Model parameters estimated for a given gas injection percentage, predicted the rest of the behavior at other compositions. ► Comparing against experimental data, predictions are remarkable in a wide range of temperature, pressure and composition.

84 **Numerical investigation on combustion of coal volatiles under various O₂/CO₂ mixtures using a detailed mechanism with soot formation**

Original Research Article

Pages 670-676

Agung Tri Wijayanta, Md. Saiful Alam, Koichi Nakaso, Jun Fukai

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Highlights

► We provide simulation on combustion of coal volatiles using an available soot model. ► Effects of temperature, pressure and O₂/CO₂ input on gas components are investigated. ► High CO₂ concentration offers eliminated PAHs/soot at high temperature and pressure. ► If CO₂ concentration is high, increasing temperature and pressure will increase CO. ► The results contribute to understanding of O₂/CO₂-blown near-zero-emission IGCC.

- 85  **In situ activation procedures applied to a DMFC: Analysis and optimization study** Original Research Article
Pages 677-683
Valter Bruno Silva, Abel Rouboa
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► A DMFC activation procedure was studied using in situ electrochemical methods. ► Design of Experiments methodology was applied to optimize the activation procedure. ► Our procedure was compared with other procedures reported in the literature.

- 86  **Chemiluminescence-based multivariate sensing of local equivalence ratios in premixed methane–air flames** Original Research Article
Pages 684-691
Markandey M. Tripathi, Sundar R. Krishnan, Kalyan K. Srinivasan, Fang-Yu Yueh, Jagdish P. Singh
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► Partial Least Squares-Regression (PLS-R) model to estimate equivalence ratios. ► PLS-R uses raw spectral intensities negating nonlinear background subtraction. ► Premixed methane–air flame equivalence ratios predicted with PLS-R. ► Equivalence ratios from PLS-R compared to those from OH/CH intensity calibrations. ► PLS-R equivalence ratio predictions were within 7% of measured values.

- 87  **Sequential pyrolysis of willow SRC at low and high heating rates – Implications for selective pyrolysis** Original Research Article
Pages 692-702
C.E. Greenhalf, D.J. Nowakowski, A.B. Harms, J.O. Titiloye, A.V. Bridgwater
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► We compared fast and slow pyrolysis of willow short rotation coppice (SRC). ► Analytical sequential pyrolysis was used to investigate product distribution. ► Pyrolysis temperature and heating rate influence product distribution. ► Bio-oil composition differs between fast and slow laboratory scale pyrolysis.

Short Communication

- 88  **Alternative fuels from waste cellulosic substrates and poly furfuryl alcohol**
Pages 703-705
Rakesh Kumar, Rajesh D. Anandjiwala
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- 89  **Renewable Energy – The Facts, Dieter Seifried, Walter Witzel. Earthscan, London (2010). 250 pp., £24.99 (paperback), ISBN: 978-1-84971-160-9.**
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- 90  **Solar Home – Design Manual for Cold Climates, Shawna Henderson, Don Roscoe. Earthscan, London. £30, ISBN: 9781844079698**
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