Upgrading of Napier grass pyrolytic oil using microporous and hierarchical mesoporous zeolites: products distribution, composition and reaction pathways

MOHAMMED, Isah Yakub, ABAKR, Yousif Abdalla, YUSUP, Suzana, ALABA, Peter Adeniyi, MORRIS, Kenobi Isima, SANI, Yahaya Muhammad and KABIR, Feroz Kabir <http://orcid.org/0000-0002-3121-9086>

Available from Sheffield Hallam University Research Archive (SHURA) at:
http://shura.shu.ac.uk/15937/

This document is the author deposited version. You are advised to consult the publisher's version if you wish to cite from it.

Published version


Copyright and re-use policy

See http://shura.shu.ac.uk/information.html
Figure 1: Schematic diagram of experimental set-up of *pyrolytic* oil deoxygenation
Figure 2: Characteristics of ZSM-5 and Modified ZSM-5. (a) XRD diffractogram, (b) Isotherms of N₂ adsorption/desorption, (c) BJH Pore size distribution (d) NH₃-TPD temperature-programmed desorption curves analysis
Figure 3: SEM-EDX images of (a) ZSM-5, (b) 0.2HZSM-5 and (c) 0.3HZSM-5
Figure 4: Effect of catalyst on deoxygenation of bio-oil at 400°C. Feed: 30 g pyrolytic oil, catalyst loading: 2.0 wt%. Solid: char and tar. Values are the means (n =3)
Figure 5: Simulated distillation using TGA. (a) Premium motor sprit-PMS, kerosene and diesel (b) Raw and upgraded organic phase pyrolytic oil. DFET, KFET and PMSFET: diesel, kerosene and PMS final evaporation temperature.
Figure 6: Selectivity of olefins and aromatic hydrocarbons
Figure 7: Summary of material, heating value and degree of deoxygenation
Figure 8: Possible reaction pathways of thermal and catalytic ex-situ upgrading of pyrolytic oil. Component in the raw pyrolytic oil, intermediate products, desired products, undesired products.
Figure 9: Reusability of 0.3HZSM-5 on deoxygenation of pyrolytic oil at 400 °C. Catalyst loading (catalyst/pyrolytic oil): 4.0 wt%
Figure 10: Characteristics of 0.3HZSM-5 catalyst. SEM-EDX (a) fresh catalyst, (b) spent catalyst, (c) regenerated catalyst after 4 cycle, (d) diffractogram of fresh and regenerated sample.