

Sonochemically assisted Ni-Ce oxide catalyst for gasification of coconut shell

ABSTRACT

Catalysts containing mixtures of nickel oxide and cerium oxide with ratio, 1:1 were prepared by the sonochemical treatment. The sonication was prolonged for 15, 45 and 75 min, different for each of the catalyst prepared supported by alumina. The resultant catalysts were characterized using X-ray diffraction, scanning electron microscope, Brunauer-Emmet-Teller surface area measurement (SBET) and temperature programmed reduction in H₂. The syngas production was detected using temperature programmed gasification and it was done under 5 % oxygen in helium. The coconut shell in powder form (3 m) was used as a feedstock. X-ray diffraction patterns shows that all of the catalyst was perfectly matched to the XRD patterns standard of NiO, CeO₂ and alumina, indicating that the catalyst produce through this method were in high purity. Catalyst with 45 min sonication shows the highest syngas production (H₂/CO) with ratio 0.76 followed by 15 and 75 min with 0.66 and 0.35, respectively. Compared to the standard optimum ratio of syngas can be used for production of acetic acid and acetyl oxide.

Keyword: Biomass gasification; Cerium catalyst; Mixed nickel oxide; Syngas production