

Support Material For

Liquefaction of lignite with Ru/C catalyst in supercritical ethanol

RongrongMiao¹, QianqiuZhang¹, Yuzhen Shi¹, JunjieGu¹, Ping Ning¹,

Qingqing Guan,^{1,2*}

1. The detection of water in sample C

We repeated the experiment C. When the reactor was opened, the acetone was employed to instead of dichloromethane as the solvent to recover the liquid solid product. The reactor was rinsed 10 mL acetone. The mixture acquired from the reactor was filtered with pinhole filters. The liquid product was analysis by the GC with TCD detector. No water peak was found in the chromatogram, which confirmed that the water was removed.

2. Reaction of water and ethanol with and without Ru/C (Sample D and E)

Reaction of water and ethanol with Ru/C (sample D) was carried out at similar conditions as the sample C. The only difference was that the same amount of water was used to place lignite (0.87 g ethanol, 0.096 g water, and 50 wt% Ru/C). Considering that the water also participated in the reaction, the total weight of water and ethanol was considered as the base to calculate the yield of oil, solid residue, and gas. About 50 wt% of the ethanol was converted into gaseous products. The main gas fractions were CH₄ (56 mol%), CO (28 mol%) and H₂ (8 mol%). The methanation reaction was promoted by the Ru/C catalyst.

In order to confirm the effect of Ru/C catalyst on steam reforming, sample E was performed with water and ethanol without Ru/C (0.87 g ethanol and 0.096 g water), little hydrogen was detected.