

“Nanocomposites and nanomaterials”

Effect of nano metal oxides on coal pyrolysis

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Coal is still a major source of energy among all energy sources [1]. However high moisture and ash content of the most coals lead to a decrease in its heating value. Therefore new type catalysts are required for coal pyrolysis to gain valuable products.

In recent years, nano size metal oxides have attracted extensive attention in various catalytic processes due to their unique properties such as high specific surface area, strong base strength, quantum size effect, nanocrystal shape and polar surface. Nano metal oxide catalyzed coal pyrolysis was performed in this study and gaseous product distribution was determined.

ZnO and TiO₂ nanoparticles were synthesized via hydrothermal method. Detailed description of the synthesis conditions were given in our previous study [2]. Low rank Turkish coal provided from Konya-Ilgın was used as a feedstock. Pyrolysis experiments were performed by the system given in our previous study [2]. Different amounts of catalyst were studied. Maximum gaseous products were obtained by using 1% (w/w) of both catalyst. Main gaseous product components consists of H₂, CH₄, CO and CO₂.

Obtained results show that the yield of gaseous product was significantly increased from 4 % to 25 % and 32% respectively in the presence of TiO₂ and ZnO (1% w/w) as a catalyst. Moreover, valuable gaseous species (such as hydrogen, methane, C₂-C₄ etc.) were also increased by the help of nano catalysts.

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References

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