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CATALYTIC APPLICATIONS OF METAL OXIDE (TiO_2 and ZnO) NANO PARTICLES ON CELLULOSE PYROLYSIS

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Nowadays, biomass energy is the most powerful alternative to fossil fuels. Biomass energy is the third biggest primary energy source after coal and petroleum [1]. One of the most biomass conversion technique is thermochemical conversion processes. Pyrolysis is the thermal decomposition of substance in oxygen-free environment and it has an extremely important place among thermochemical conversion technologies.

Effect of various catalysts on cellulose pyrolysis has been widely known [2] However usage of nano catalysts on cellulose pyrolysis leads to a new type product distribution of cellulose conversion.

In this study TiO_2 and ZnO nanoparticles were synthesized by hydrothermal method. Average particle sizes of two different metal oxide catalysts were determined in the range of 15-25 nm and 30-50 nm respectively according to the TEM micrographs. The nanoparticles were characterized by X-ray diffraction (XRD) and Braun-Emmet-Teller (BET) N_2 adsorption techniques.

Both nano catalyst leads to an increase in the gaseous product yield with increasing temperature. Our findings show that TiO_2 is more efficient catalysts comparing to ZnO in view of gas yields. Gaseous components mainly consist of H_2, CH_4, CO, CO_2. Effect of nanocatalysts on the amount of gaseous components was also discussed.

References

1. *Bridgwater A.V.* Biomass conversion technologies*:* Fast pyrolysis liquids from biomass: Quality and upgrading // Biorefineries. -2017.**-57.-**P. 55-98

2. *Casoni I.A., Nievas M.L., Moyano L.E., Alvarez M., Diez A., Dennehy M., Volpe A.M.* Catalytic pyrolysis of cellulose using MCM-41 type catalysts // Energ. Convers. Management. -2016.**-514**.-P. 235-240.