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Impact of pyrolysis temperature on the characteristics and utilization potential of bio-chars derived from wooden dust

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To meet the global demand of energy, coal is the predominant source, which is depleting gradually and requires an alternative source preferably with less concern of climate change. Keeping this in view impact of pyrolysis temperatures on the characteristics of bio-chars derived from pyrolysis of the wooden dust and its utilization potential, was examined. The pyrolysis was carried out in a pyrolysis chamber at 400, 600, 800 and 1000°C for an hour, using heating @ 5-15°C/min. The obtained results evince that wooden dust can be a potential source for pyrolysis. Low temperature pyrolysis produced bio-char with high yield, but high temperature pyrolysis led to low yield bio-char with higher content of carbon and heating values. Thermal analysis of the wooden dust showed higher degradation profile that is weight loss increases with increase in temperature. Bio-chars from wooden dust particularly at temp 600-800°C can be more suitable for steelmaking, in view of their chemical and thermo-chemical characteristics including low ash, higher heating values (HHV), high surface area, etc.. In traditional iron making reduction of iron ores to metallic iron is done by coke which acts as a reductant and source of energy as well. The coal used for coke making is premium in quality and has limited reserves, so an attempt has also been made to reduce the requirements of coking coal using wooden dust char through direct reduction of iron ore. The obtained results show that highest percentage of reduction can be achieved in case of wooden dust char as compared with coal. Also kinetic study of the work shows activation energy 75.16 KJ/mole.

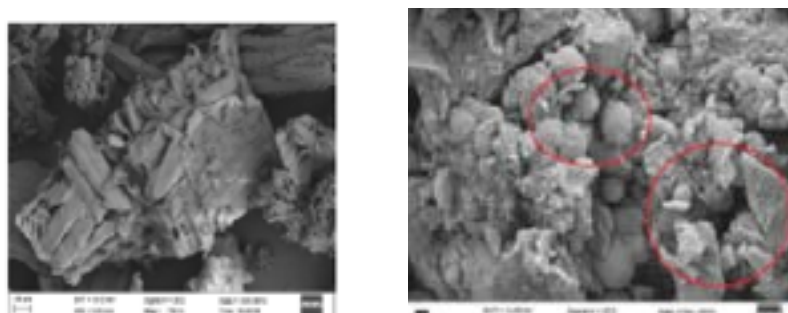


Figure 1: FE-SEM image of Wooden Dust and Wooden Dust Char

Biography

Shalini Gautam has more than 15 years of experience in Research & Teaching. She has her expertise in Fuel Technology, Coal characterization, Coal carbonization, Coal combustion and Gasification. Her recent area of work is on 'Utilization potential of Indian Biomass for different thermo chemical processes like combustion, carbonization, gasification, etc.; utilization of poor quality coking coals for metallurgical applications.

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