

Design and Development of Packed Bed Oil Scrubber for Cleaning of Producer Gas

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The huge potential of biomass as an alternative energy source can be utilized by gasification process. Gasification is thermochemical conversion technologies, which converts biomass to Burnable gases called producer gas. Major components of this gas are hydrogen, carbon monoxide and methane. Depending on the purity, this gas can be used in the furnace for heat generation and in the internal combustion engine and fuel cell for power generation or it can be converted to liquid hydrocarbon fuels and chemicals via the Fischer Tropsch synthesis method. The only hurdle in this process is tar produced by gasification. Tar is a condensable sticky high molecular weight hydrocarbon which blocks downstream application process of producer gas (gasified biomass). Wet packed bed scrubber can be best tar removal method if used with good scrubbing solvent. In this research a 20 kg/hr downdraft gasifier was used for gasification. Wet packed bed scrubber with oil as solvent for was used for cleaning and cooling of producer gas. Cyclone filter was used initially for removal of ash, dirt and particulate matters. Palm oil was used as scrubbing solvent which serve the purpose of both cleaning and cooling of gas. Wood chips, crushed stones and jute bags were used as packing material which can be recycled. The packing height of 300 mm was best suited. Pressure drop generated across the system was 47 mm of water. Oil was tested at flow rates of 4, 5 and 6 lpm. The gas cleaning was checked by flaring, oil density change and filter fibre method. The tar removal efficiency of the system was in range of 70-80%.



Fig. Photograph of experimental set up