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A study on the possibility of using marine florae as alternative energy source: extraction of bio-oil and produced gas

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Abstract. Marine florae are marine driftees that liters the beach front and posed a solid waste disposal problem for the beach resorts. This study aims to solve the waste disposal problem of the marine florae and at the same time investigate the possibility of making it as an energy source through pyrolysis. Pyrolysis or the thermal degradation of biomass that leads to the release of the volatiles in the absence of oxygen. Its products include bio-oil, pyrolysis gas, and char. Processed bio-oil could be possibly used as lubricating oil, fuel oil, and for production of chemicals. The pyrolysis gas is composed of combustible gases that can be directly as fuel to produce heat or power. Char, composed mainly of carbon that can also be used as solid fuel or soil conditioner. Eleven types of marine florae (green, brown, red and sea grass) pellet samples were pyrolyzed to determine the possibility for bio-oil and pyrolysis gas production. Pyrolysis experiments results revealed that for each type of marine florae pellet, the average bio-oil yield was about 69.93% and the average pyrolysis gas yield was about 30.07%. Pure green algae (no binder) produced the highest (93.02%) bio-oil production while pure red alga (no binder) produced the highest pyrolysis gas production (46.67%). The experiment was conducted at a pyrolyzing temperature of 110oC to 250oC. It was within this temperature range that there was a rapid decrease of the loaded pellets' weight and production of bio-oil and pyrolysis gas were observed.