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Thermochemical conversion pathways of *Kappaphycus alvarezii* granules through study of kinetic models

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ABSTRACT

Kappaphycus alvarezii seaweed belongs to the class of red alga (Rhodophyta). The granules obtained after recovery of "sap" (liquid plant stimulant) from freshly harvested alga is a promising biomass feedstock for energy application. Herein we report the kinetic behaviour of the granules using thermogravimetric analysis (TGA) at different heating rates in N_2 atmosphere and thermogravimetric mass (TG-MS) analysis. Sawdust as lignocellulosic biomass is considered for comparative study. Four different kinetic models (i) multilinear regression technique (ii) Friedman method (iii) Flynn-Wall-Ozawa (FWO) method and (iv) Kissinger-Akahira-Sunose (KAS) methods are used to evaluate the apparent activation energy (E_a), the pre-exponential factor (A_α) and the overall reaction order (n). Maximum SO_2 peak at 300 ^{o}C and 950 ^{o}C (from TG-MS), indicates that slow pyrolysis at 500 ^{o}C, with a packed bed lime scrubber at the outlet during temperature rise, is the best suited thermochemical pathway for energy harnessing.