Characterization of Kappaphycus sp. and Padina sp. as biosorbents for heavy metal ions removal

ABSTRACT
The determination of iron, copper and zinc metal ions removal has been conducted using seaweeds (Kappaphycus sp. and Padina sp.) as biosorbents. The seaweed was dried using two different drying techniques: oven drying (60 °C, 80 °C and 100 °C) and sun drying. The main functional groups responsible for the metal bindings in seaweed were identified using Fourier transform infrared spectroscopy. It showed that carboxyl, ether, alcoholic, and amino groups participated in the ionic exchange by functional groups on the surface area of metal-treated and untreated seaweed. Phytochemical analysis was conducted to determine the total phenolic content of the samples, as polyphenols are well known for metal binding. In comparison to the other drying techniques, oven-dried (60 °C) for Padina sp. (0.2133±0.0125 mg GA/g DS) and Kappaphycus sp. (0.0882±0.0071 mg GA/g DS) had the highest phenolic content. Inductively coupled plasma – optical emission spectrometry was also used to measure the reduction of heavy metal concentration in the biosorption process. Sun drying for both biosorbents, Kappaphycus sp. (86.08%) and Padina sp. (72.75%), achieved high metal adsorption levels for copper ions. According to the results, the rank of metal adsorption abilities of the samples by drying method is oven-dried (60 °C) < oven-dried (80 °C) < oven-dried (100 °C) < sun-dried.