Electrophoretic deposition of adsorbed arsenic on fine iron oxide particles in tap water

ABSTRACT

Electrophoretic deposition (EPD) technique has been demonstrated to remove arsenic with natural adsorbent (fine iron oxide particles) in tap water samples. Characterizations of metal element particularly arsenic and fine iron oxide particles in tap water from two different locations, i.e. commercial and residential areas, were conducted. Results showed that the concentration of arsenic in tap water from residential area was higher than commercial area samples i.e. 0.022 ± 0.004 and 0.016 ± 0.008 ppm, respectively. The same finding was observed in zeta potential value where it was higher in the residential area than commercial area, i.e. ī 42.27 ± 0.12 and ī 34.83 ± 0.23 mV, respectively. During the removal of arsenic using the EPD technique, direct current (DC) voltage was varied from 5 to 25V at a constant electrode distance of 30 mm. Effect of zeta potential, voltage and electrode type were intensively investigated. High percentage removal of arsenic was obtained from carbon plate than carbon fibre electrode. The percentage removal of arsenic from all samples slightly decreased with increasing of the applied voltage. EDX analysis confirmed that arsenic has adsorbed onto deposited iron oxide particles on the anode electrode. Overall, EPD technique was found to be successful in removing arsenic onto fine iron oxide particles in tap water with 26% ± 1.05 of removal.

Keyword: Arsenic; Electrophoretic deposition (EPD); Fine iron oxide particle; Voltage