






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 Water Environment Research
 Volume 89, Issue 4, 1 April 2017, Pages 292-300

Cake compressibility analysis of BPOME from a hybrid adsorption-microfiltration process (Article)

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Abstract

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This study investigates the utility of a hybrid adsorption-membrane process for cake compressibility evaluation of biotreated palm oil mill effluent (BPOME). A low-cost empty fruit bunch (EFB) based powdered activated carbon (PAC) was employed for the upstream adsorption process with operation conditions of 60 g/L PAC dose, 68 min mixing time, and 200 rpm mixing speed to reduce the feed-water strength and alleviate probable fouling of the membranes. Two polyethersulfone microfiltration (MF) membranes of 0.1 and 0.2 μm pore sizes were investigated under constant transmembrane pressures (TMP) of 40, 80, and 120 kPa. The compressibility factors (z), which was obtained from the slopes of power plots (function of specific cake resistance (α) and pressure gradient) were evaluated. The z values of 0.32 and 0.52, respectively obtained, for the 0.1 and 0.2 μm MF membranes provided compressible and stable z values as observed from their power plots. Besides, these membranes were found suitable for the measurement of z since the results are in consonance with the established principle of cake compressibility. Moreover, the upstream adsorption mitigated the clogging of the membranes which ultimately led to moderate resistances and cake compressibility. These are indications that with the secondary cake filtration, a sustainable flux can be achieved during BPOME filtration. The membranes exhibited close to 100% restoration after cleaning.

Author keywords

Cake compressibility MF membranes POME Pressure drop Resistance Sustainability

Indexed keywords

Engineering controlled terms: Activated carbon Adsorption Carbon Compressibility Effluents Electric resistance Microfiltration Mixing Palm oil Pore size Pressure drop Sustainable development

Compendex keywords: Cake compressibilities MF membrane Micro-filtration membranes Palm oil mill effluents POME Powdered activated carbon Specific cake resistances Transmembrane pressures

Engineering main heading: Membranes

Emtree drug terms: activated carbon manganese polyethersulfone silicon dioxide industrial waste palm oil vegetable oil

Geobase Subject Index: activated carbon adsorption aquaculture effluent cost compressibility concentration (composition) filtration membrane operations technology pollutant removal pressure drop sustainability

Emtree medical terms: adsorption alkalinity Article biotreated palm oil mill effluent chemical oxygen demand compression effluent membrane membrane filter membrane permeability microfiltration pressure priority journal turbidity viscosity water hardness adsorption filtration industrial waste procedures waste management

MeSH: Adsorption Filtration Industrial Waste Plant Oils Waste Management

Chemicals and CAS Registry Numbers:

activated carbon, 64365-11-3, 82228-96-4; manganese, 16397-91-4, 7439-96-5; polyethersulfone, 25667-42-9; silicon dioxide, 10279-57-9, 14464-46-1, 14808-60-7, 15468-32-3, 60676-86-0, 7631-86-9; palm oil, 8002-75-3;

Industrial Waste; palm oil; Plant Oils

ISSN: 10614303

CODEN: WAERE

Source Type: Journal




Original language: English

DOI: 10.2175/106143017X14839994522948

PubMed ID: 28376999

Document Type: Article

Publisher: Water Environment Federation

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