

Oil Extraction from Spent Bleaching Earth

Mäki-Arvela, P.^a, Kuuluvainen, V.^a, Toukoniitty, B.^b, Murzin, D. Yu.^a,

^aÅbo Akademi University, Turku, Finland,

^bNeste Oil, Porvoo, Finland

Bleaching of oil for production of green diesel is a necessary step prior to the catalytic hydrotreatment. Both vegetable oils and animal fats have been applied as feedstocks. During oil bleaching several impurities, such as metals and phospholipids are adsorbed on clays. The spent clay contains in addition to the adsorbed impurities also oil, which is economically important to recover. Extraction of oil from the spent bleaching earth has been very scarcely investigated in open literature [1]. The aim of this work was to study extraction of different oils from two different clays. In addition, mass balances for different elements, characteristics of the adsorbent before and after extractions as well as properties of the extracted oil have been determined.

Extraction from the spent bleaching earth was performed in Soxhlet apparatus with hexane as a solvent in reflux. The extraction efficiency was determined by weighing the extracted oil and comparing it to the theoretical extraction capacity of the clay determined by TGA. Fresh and spent clay were characterized by following methods: TEM, SEM, EDXA, TGA, DSC, nitrogen adsorption, FTIR, Hg-porosimetry and XRD. The extracted oil was analyzed with DCS, ICP-MS and SEC.

The results revealed that the extraction rate of oil was increasing with extraction time

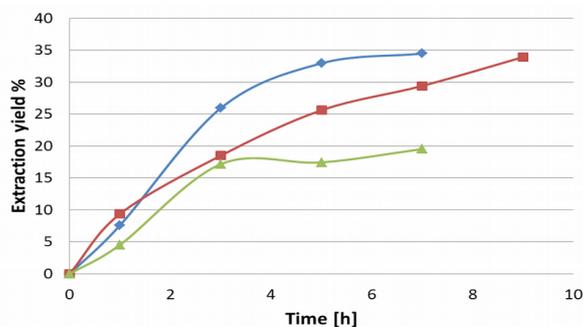


Fig. 1. Extraction yield of oil A (◇) and B (□) with sepiolite and oil (C) with palygorskite (△) in reflux with hexane.

(Fig. 1) and with the specific surface area of the clay. The feedstock with lower melting, A was easier to be extracted compared to that of B. The extracted oil exhibited similar quality as the bleached oil, especially glyceride composition. In the final work the distribution of different elements in bleached oil, extracted oil and adsorbent will be presented together with the detailed characterization of fresh and spent adsorbents.

References:

1. Lee, C. G., Seng, C. E., Liew, K. Y., J. Am. Oil Chem. Soc.

2000, 77, 1219-1222.