THESIS TITLE : REMOVING OF FILTER ALUM FROM SEDIMENTATION IN WATER SUPPLY SYSTEM

AUTHOR : MR. SAYAN KAEWBOONRUANG

THESIS ADVISOR COMMITTEE

Thawatchai Nienvitoon ....Chairman

(Associate Professor Thawatchai Nienvitoon)

S. Sinsupan ....Member

(Associate Professor Suparerk Sinsupan)

Jiraporn Khiewyoo ....Member

(Dr. Jiraporn Khiewyoo)

ABSTRACT

This laboratory experimental research aimed to examine appropriate sludge-age and also to find any suitable pH levels for removing alum from sediment of Kota water supply plant, Khon Kaen Thailand. The analyzed sediments were both the sediments coagulated in laboratory, using raw waters transferred from the plant, and fresh sediment recovered from the sedimentation tank of the water supply plant. The examined sludge-ages ranged individually from 1-30 days, while adjusted pH levels, used sulfuric acid, were 0.5, 1.0, 1.5, 2.0, 2.5 and 3.0 respectively. The measurement of alum removal from the sediments quantified as weight-percent alumina (Al_2O_3) extracted following the analysis method described in the Standard for Aluminium Sulphate, Potash Alum and Ammonium Alum (UDC 661.862.8, 661.862.84, 661.862.86).

The results showed the residual alum were peaked on the 15^{th} day of sludge age. (0.07076%, mean 0.03818 $\pm$ 0.01679) while in the sludge Collected from the plant maximized at 16^{th} day (0.10140%, mean 0.03230 $\pm$ 0.01660). The sludge-ages and pH levels which yielded maximum alumina removal from laboratory and plant sludge were at 10^{th} day with pH 0.5 (0.95300%, mean 0.17900 $\pm$ 0.15700) and 24^{th} day with pH 0.5 (0.51900%, mean 0.12700 $\pm$ 0.13300) respectively. Alumina removal between laboratory and plant sludge was not significantly different (P>0.05) at the same sludge-age and pH

in individual samples. The pH levels which yielded maximum alumina removal from the laboratory and plant sludge were 0.5 and 1.0 respectively. There was significantly different in alumina removal ($P<0.05$) of the samples collected from the same sludge source but different pH levels, while the greater percent removal found at pH 0.5 than 1.0. The varied sludge-ages were contributed differently to the significant alumina removal. The laboratory sludge was maximally removed at 14^{th} (0.85080%) and 17^{th} day (0.79110%) with pH 2.5 and 3.0 consecutively (mean 0.10752 ± 0.15118).The plant sludge yielded maximum removal in two following sludge-ages, which were 10^{th} and 16^{th} days with pH 3.0 (0.55590%) and 2.5 (0.50660%) respectively (mean 0.08200 ± 0.11090). There was no different alumina removal at similar pH level ($P>0.05$) of consecutive samples analyzed from both laboratory and plant sludges.The individual samples from the same sludge source but varied pH (2.5 and 3.0), the alumina was not significantly removed ($P>0.05$). Thus, the result then suggested that it would be much more effective to extract alum at pH 3.0 rather than 2.5 so as to reduce cost also with more safety-handling.

Finally, the study results showed that the sludge-age should be no more than 14 days at pH 3.0 for efficiency of remove alum. Further advantage is to minimized of environmental problems and health impacts whenever such alum is removed from excess water supply sedimentation prior to discard them onto any land spreading.