Thosapol Sukata 2007: A Study on Efficiency Enhancement for Industrial Water Treatment Using Turbulent Intensity and Magnetic Field Variation
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Water is one of the most important factors in industrial manufacturing process. At present, the problems found in a manufacturing process are the improper water conditions which affect the efficiency of the machines. Using chemicals in industrial water treatment results in cost increase and serious environmental effects.

This research aims to study the influence of magnetic field and flow turbulence on pH level, hardness and pipe-scale quantity by recirculating water through different intensity of magnetic field, 128.2, 199.2, 267.8 and 335.0 mT. Moreover by installing twisted plates which have different pitches per the width of plates of 4.0, 6.0, 8.0 and 10.0 given various turbulent intensity of the flow. From the results obtained, it was indicated that the efficiency in hardness reduction ($\eta_{\Delta_{hardness}}$) and efficiency in pipe scale reduction ($\eta_{pipe\text{-}scale}$) were increased with intensity of magnetic field. In contrast, the magnetic field intensity did not effect the pH level. With the twisted plate installed, it was found that the smallest pitch per the width of plates of 4 had the most effect on $\eta_{\Delta_{hardness}}$ and $\eta_{pipe\text{-}scale}$ enhancement. Gradually increased the pitch per the width of plate resulted in the reduction in $\eta_{\Delta_{hardness}}$ and $\eta_{pipe\text{-}scale}$. Finally, the study concisely showed that the increase in turbulent intensity and magnetic field would enhance the efficiency of industrial water treatment. Besides, at the range of magnetic field 128.2 – 335.0 mT and the pitch per the width of plate of 4.0 – 10.0, The equations used to evaluate the water treatment efficiency were $\eta_{\Delta_{hardness}} = 8.416B' - 6.3 \times 10^{-2}y$ and $\eta_{pipe\text{-}scale} = 44.90\ B' - 0.371y$.

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