THE EFFECT OF TEMPERATURE, TURBULENCE, AND PH ON THE SOLUBILITY OF MTBE

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ABSTRACT

Methyl tertiary butyl ether (MTBE) is a fuel oxygenate whose discharge is inevitable in the environment, consequently posing serious health and environmental effects. The solubility of this volatile organic compound (VOC) has not been studied extensively, the few studies available present contrasting views. This study used a spectrophotometer to determine the effects of pH (5, 7 & 9), mixing rate (400 rpm & 600 rpm), and time (1 hour) on the solubility of MTBE in water. We calculated the ^max and the molar absorptivity of MTBE as 190 nm and 167 M-cm- respectively. MTBE spiked at pH 9 gave the highest absorbance, while the results obtained at pH 5 gave the lowest absorbance. However, MTBE spiked at pH 7 was more soluble and relatively stable. A low mixing rate of 400 rpm enhanced the solubility of MTBE indicating that turbulence reduces the solubility of MTBE in water. Moreover, our results indicate that low temperature enhances the solubility of MTBE. The solubility of MTBE at 25 °C using a mixing rate of 400 rpm and 600 rpm was 0.08 g/L and 0.044 g/L respectively. Additionally, the solubility at 30 °C using a mixing rate of 400 rpm and 600 rpm was 0.068 g/L and 0.12 g/L respectively.

Keywords: MTBE, VOC, Solubility, Spectrophotometer.