Hong Kong Chemistry Olympiad 2006 **Diocesan Girls' School**

"Adsorption of Dye by Activated Sludge"

Abstract

Dye pollution is a serious environmental issue. Dyes, often toxic, will cause biological magnification in marine or aquatic organisms when released, disrupting the food chain and ecology of habitats. However, traditional dye treatments are usually expensive. It is important to find cheaper and more environmentally-friendly methods.

A lake in mainland polluted by dye discharged from nearby industrial factories

Image source: CBCF

In our investigation titled **Adsorption of Dye by Activated Sludge**, the dye adsorption characteristics of activated sludge were investigated. Our core investigation focused on the dye Basic Violet 10, and factors were studied to find the optimal conditions for the reaction.

Results showed that within 30 minutes, the optimal conditions for the reaction were: pH 7, stirred, room temperature (20^{o}C), and dye to activated sludge (with water content) mass ratio of 1:240. Investigation also revealed that the reaction is exothermic and irreversible. These results point to the fact that chemical reaction is involved and the reaction belongs to chemisorption.

Extended investigation showed that the effectiveness of sludge in dye adsorption is close to that of activated carbon. We therefore recommend the use of activated sludge in wastewater treatment as a replacement of activated carbon to make the industrial process more environmentally friendly.