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# Hydrogen production affected by Pt concentration on $TiO_2$ produced from the incineration of dye wastewater flocculated sludge using titanium tetrachloride

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**ABSTRACT**

$TiO_2$ from the incineration of dye wastewater flocculated sludge using $TiCl_4$ coagulant was produced. Optimal catalyst amount and Pt-loading on $TiO_2$ were studied for the production of $H_2$ by photocatalytic reforming of methanol (6% vol.). On the other hand, BTSE (biologically treated sewage effluent) was flocculated using $TiCl_4$ and produced sludge was incinerated to generate $TiO_2$. $TiO_2$ was loaded with optimum Pt and added to the supernatant in a photocatalytic reactor to test the efficiency of using remaining organics as a "sacrificial reagent" for photocatalytic hydrogen production. Dissolved organic carbon (DOC) and molecular weight distribution (MWD) were measured for nanofiltration (NF) and $TiCl_4$ flocculation followed by photocatalysis. $TiO_2$ (from the incineration of BTSE flocculated sludge using $TiCl_4$) was produced and loaded with 0.5% Pt. Results showed that the optimum concentration of $TiO_2$ (from dye wastewater) for $H_2$ production was 0.3 g/L, while the optimum amount of Pt was 0.5%. DOC and MWD removal was similar for the flocculation of BTSE followed by photocatalytic reaction and the NF process. Remaining organic compounds after flocculation could not be used as sacrificial reagent to induce $H_2$ production. Further investigations on studying the UV intensity and/or identifying organic/inorganic scavengers to inhibit $H_2$ production are underway.

*Keywords*: Dye wastewater; Hydrogen production; Platinum; Titanium dioxide

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