

Hydrothermal sulfate
for nitric oxide and
formaldehyde.
difference



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Hydrothermal methodology was used to synthesize the photocatalytic zinc sulfate microtubes. In a typical procedure, 2 mmol of $\text{SnCl}_4 \cdot 5\text{H}_2\text{O}$ and 4 mmol of $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ were dissolved into 35 mL of deionized water to form two transparent solutions, respectively. The two solutions were mixed together, and then 2 g of cellulose acetate (CA) was added to the above mixture under vigorous magnetic stirring for 10 min. Then 0.5 M NaOH solutions were added dropwise into the above mixed solution until the pH of the suspension was adjusted to 10 under magnetic stirring. After heating this suspension in an autoclave for 2 days at 220°C and allowing it to cool down, filtration was performed to separate the resulting precipitates. These precipitates were then subjected to washing and drying.

By using the same methodology SnO_2 as well as ZnO photocatalyst were also synthesized⁵. Measurement of photocatalytic activity by using continuous flow reactor and reverse phase column Indoor air pollutants Degradation of formaldehyde (HCHO) and nitric oxide (NO) Continuous flow reactor and reverse phase column was used to detect the photocatalytic activity of zinc sulfate for nitric oxide and formaldehyde. Difference in concentration of pollutants in inlet and outlet stream estimates the degradation activity of photocatalyst. It has been shown in Fig.

6. that photocatalytic activity of Zn_2SO_4 microtubes is higher than other photocatalyst used for drawing a comparison i. e. SnO_2 as well as ZnO . As it can be seen from this plot the removal rate of NO by Zn_2SO_4 was 69.9% as compared to 42.

1% by ZnO and 33.9% by SnO₂. The main reaction involved in oxidation of NO has been given in following equations. Nitrous and nitric acid are formed as a result of reaction between NO and reactive radicals¹⁶.

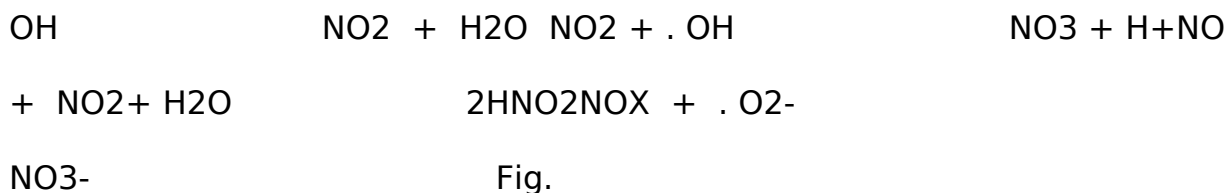


Fig.

6. Plot between concentration of NO and irradiation time It has been shown in Fig. 7.

that photocatalytic activity of Zn₂SO₄ microtubes is higher than other photocatalyst used for drawing a comparison i.e. SnO₂ as well as ZnO. As it can be seen from this plot the removal rate of HCHO by Zn₂SO₄ was 26.4%. Photocatalytic oxidation of formaldehyde involves a chain reaction that is regulated by hydrogen peroxide, hydroxyl radicals and superoxide radical.

As a result of this reaction the product formed may be formic acid or carbon dioxide depending upon the proportion of number of pollutant molecules adsorbed and holes generated. The main reaction involved in oxidation of HCHO has been given in following equations^{5, 17}.

$$\begin{aligned} \text{HCHO} + \text{H}_2\text{O} + \text{h}^+ &\rightarrow \text{HCHOOH} + \text{h}^+ \quad (\text{pollutant molecules adsorbed} > \text{holes}) \\ \text{HCHO} + \text{H}_2\text{O} + \text{h}^+ &\rightarrow \text{CO}_2 + \text{h}^+ \quad (\text{pollutant molecules adsorbed} < \text{holes}) \end{aligned}$$