

Azadrachea Indica leaves extract assisted green synthesis of Ag TiO₂ for degradation of methylene blue and rhodamine B dyes in aqueous medium

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1. Introduction – Water pollution by textile industry is one of the important issues. Therefore, there is a need for methods to remove organic dyes from textile industrial effluents. Various metal oxides have been used as catalysts for degradation of these dyes. The catalytic efficiency of metal oxide can be enhanced by doping with metals. Here, we report the synthesis and characterization of Ag-TiO₂ and evaluation of its photo catalytic efficiency towards aqueous phase photo-degradation of rhodamine B dye.

2. Experimental –TiO₂ was purchased from Sigma-Adrich. Ag-TiO₂ catalysts with 1, 2, 3 and 4% were prepared by green methods using neem plant (*Azadrachea Indica*) as reducing agent for Ag¹⁺ from AgNO₃. Prepared catalysts were characterized by SEM, XRD, FTIR and TGA. Prepared Ag-TiO₂ was employed as photo catalyst for degradation of rhodamine B dye in aqueous medium. Pyrex glass batch reactor was used for catalytic degradation experiments in the presence of oxygen.

3. Results and Discussion - It was observed that doping of Ag enhanced the photo catalytic performance of TiO₂ from 29 to 90% degradation of rhodamine B dye (50 mL, 200 mg/L) in 60 min at 313 K. Irradiation of TiO₂ excites electrons from conduction band to valence band yielding an electron-hole pair. These photo excited electrons and positive hole undergo secondary reaction and produce OH radicals. These active radicals take part in degradation of rhodamine B dye. Ag doped on TiO₂ prevents the recombination of photo excited electrons and positive hole thus enhancing the photo catalytic activity of TiO₂ as explained in Image 1. Photo catalytic degradation of rhodamine B dye followed Eley-Rideal mechanism which states that dye react in fluid phase with adsorbed oxygen.

4. Conclusions - The enhancement of photo-catalytic activities of TiO₂ by deposition of Ag using plant extract is economical and environmentally friendly as compared to chemical methods and this is the novelty of present work.

5. References

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