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## **SYNERGISTIC ELIMINATION OF Cr(VI) AND Ni(II) IONS WITH TRACE AMOUNTS OF TITANIA PHOTOCATALYST NANOPARTICLES**

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### **Abstract**

The separate and simultaneous photocatalytic reduction of poisonous Cr(VI) and Ni(II) ions were examined with trace amounts of commercial titania nanoparticles (up to 50 mg/L). A direct irradiation photo-reactor, equipped with ultrasonic source was employed. The effects of four influencing parameters, catalyst dosage, pH, temperature and metal ions concentration ratio were investigated. The simultaneous operations, in the ternary Cr(VI)/Ni(II)/TiO<sub>2</sub> system, show a synergism in reduction efficiency compared to just individual ions treatments. The influence of the hole scavengers to intensify the process was appeared in the order of ethylene glycol > formic acid > citric acid. Under the best found conditions of [TiO<sub>2</sub>]=40 mg/L, pH=7.5, T=35° C, ratio of [Cr(VI)]<sub>0</sub>/[Ni(II)]<sub>0</sub>=0.5 and 100 mg/L ethylene glycol, 58.9% reduction in Cr(VI) and 66.0% in Ni(II) ions were achieved after 110 min irradiation. The perfect reaction kinetic was determined for individual ions. Accordingly, the energy consumption was evaluated. This parameter, together with the significant achieved efficiency, confirms the high performance of the used process in comparison with a similar simultaneous reduction work.

*Key words:* divalent nickel, energy consumption, hexavalent chromium, nano titania, simultaneous reduction

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