

## **Magnetite Nanoparticle on Modified Fenton Degradation in Treating Emerging Pollutant of Paracetamol**

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### **Structured Abstract**

**Background:** Paracetamol from pharmaceutical industries creates an environmental and health issues due to increase discharge into waterbodies. Therefore, the treatment using magnetite nanoparticle (MNP) as an adsorbent in removing the paracetamol could be a promising solution.

**Methods:** Synthesis of MNP was prepared with some modification. In this study, the MNP was synthesized via co-precipitation of ferric chloride hexahydrate and ferrous sulphate heptahydrate and acted as an adsorbent for the removal of paracetamol from aqueous solutions. The properties of MNP were characterized by XRD. The adsorption process was conducted in a batch system, and the effects of contact time on paracetamol uptake was investigated.

**Results:** The observed XRD pattern was in a good agreement with the standard XRD pattern for magnetite. The results showed the reaction time was inversely proportional to the absorbance of the residual paracetamol as the reaction time increased, the adsorption increased. The removal percentage of paracetamol increased with the increase in contact time. Adsorption at acidic conditions can only achieved the maximum removal of 17.7% within 60 minutes. Due to good magnetic properties of MNP, the separation of MNP from water sample become more easier which benefit the reaction treatment time and treatment cost. The pH 3 was the best condition in the absorption of paracetamol. This is because the recombination of  $\cdot\text{OH}$  radicals under acidic condition is less effective and slower than  $\cdot\text{OH}$  attack on pollutant. Thus, the degradation rate is higher at lower pH values. It is well known that the hydrolysis of paracetamol is catalyzed by protons and hydroxyl ions and the process is insignificant at a pH near 6.

**Conclusion:** The modified Fenton was found to be quite an effective adsorbent for the removal of paracetamol from wastewater, and the findings of this study can be useful for developing eco-friendly and cost-effective methods for the treatment of pharmaceutical wastewater.

**Keywords:** Emerging pollutant, Fenton oxidation, Paracetamol, Wastewater treatment

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