

Identification and Estimation of Metal Contaminants in Wastewater using Complexometric Titration: A Study on Pb, Mn, and Hg

Dr. Sajid F. Shaikh, Nida M. Gorme, Mali Rutika Ravindra

Anjuman Islam Janjira Degree College of Science, Murud-Janjira, Raigad, Maharashtra, India

Abstract: Industrial and agricultural activities often lead to the contamination of wastewater with heavy metals such as lead (Pb), manganese (Mn), and mercury (Hg), which pose significant environmental and health risks. Monitoring the concentration of these metal contaminants is crucial for water quality assessment and pollution control. This study aims to identify and estimate the levels of Pb, Mn, and Hg in wastewater samples using complexometric titration, a well-established analytical technique.

Wastewater samples were collected from various industrial discharge sites and subjected to complexometric titration using ethylenediaminetetraacetic acid (EDTA) as the titrant for metal ion determination. The metal ions were first pre-treated with appropriate reagents to form stable complexes, and then their concentrations were determined by measuring the end point of the titration using a suitable indicator. The results were compared against the permissible limits for heavy metals in wastewater, as set by environmental protection agencies.

Preliminary findings indicate that Pb and Hg concentrations exceeded the regulatory limits in certain samples, while Mn levels were within acceptable thresholds. The study demonstrates the effectiveness of complexometric titration in the precise estimation of metal contaminants in wastewater, offering a simple, cost-effective approach for environmental monitoring. Future research will focus on improving detection sensitivity and exploring the integration of this method into real-time monitoring systems..

Keywords: Metal Contaminants, Wastewater, Complexometric Titration, Lead, Manganese, Mercury, Environmental Monitoring

