# Accurate determination of organic COD of wastewater treated by the Fenton Process in latex glove manufacturing industry

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Fenton reaction generates reactive hydroxyl radicals by the reaction between $H_2O_2$ and iron ($Fe^{2+}/Fe^{3+}$) is sometimes used in glove manufacturing industries to oxidize organic compounds in wastewater. Chemical oxygen demand (COD) is an important parameter used to assess the quality of raw and treated wastewater. The existing dichromate reflux method for organic COD determination assumes that dichromate is only reacting with the organic compounds in the sample; however, the assumption is not valid for wastewater treated by the Fenton reagent because of the presence of residual amounts of $H_2O_2$ and $Fe^{2+}$ which also react with dichromate. Hence the existing method was modified to improve its accuracy by eliminating these interferences. The Fenton reagent used here has 1400 $mgL^{-1}$ of $H_2O_2$ and 150 $mgL^{-1}$ of $Fe^{2+}$ respectively. The simulated wastewater sample was prepared using ethanol, acetic acid and isopropyl alcohol. The Fenton reaction was initiated by mixing 100.0 mL of wastewater with 1.0 mL of the reagent. The final pH of the mixture was approximately 2.5. Sample aliquots (10.0 mL) were withdrawn from the mixture on hourly basis for 5 hours and determined its COD value using the existing dichromate method. In addition, the residual concentrations of $H_2O_2$ and $Fe^{2+}$ in the sample aliquot were also determined by iodometric titration and 1, 10 - phenanthroline colorimetric method respectively. The theoretical equivalents of oxygen required for oxidizing $H_2O_2$ and $Fe^{2+}$ by dichromate were calculated from stoichiometric redox reactions between $Fe^{2+}$, $H_2O_2$ and dichromate. The oxygen equivalents calculated from the previous step were subtracted from the COD values determined by the existing dichromate method to eliminate the interference caused by them. This correction improved the accuracy of the organic COD values. According to the experimental data, COD values determined by the existing method were always 20 % to 30 % greater than the corrected COD value. It can be concluded that for the determination of organic COD by the existing dichromate method overestimate the COD value if reducible non-organic compounds are present in the sample and therefore, a correction is required to eliminate the interferences caused by the reducible non-organic compounds.

**Keywords:** COD, Fenton, Wastewater