In this paper, the application of Fenton oxidation process for the decolorization of an azo dye Direct Blue 15 (DB15) in aqueous solution was investigated. The effect of initial pH, dosage of H2O2, H2O2/Fe2+ and H2O2/dye ratios and the reaction temperature on the decolorization efficiency and kinetic of the DB15 were studied, the operating parameters were preferred by changing one factor at one time while the other parameters were kept constant. The optimal conditions for the decolorization of DB15 were determined as pH=4.0, [H2O2] = 2.8x10(-3) mol/L, H2O2/Fe2+ ratio = 100: 1, H2O2/dye ratio = 60: 1 and temperature = 30 degrees C. Under the optimal conditions, 4.7 x 10(-5) mol/L of the DB15 aqueous solution can be completely decolorized by Fenton oxidation within 50-min reaction time and the decolorization kinetic rate constant k was determined as 0.1694 min(-1). Additionally increasing the reaction temperature from 20 to 40 degrees C showed a positive effect on the decolorization efficiency of DB15. The present study can provide guidance to relational industry operators and planners to effectively treat the DB15 contaminated wastewater by Fenton oxidation process. (C) 2009 Elsevier B. V. All rights reserved.