Abstract :

Ammonia and ammonium ions are potentially dangerous for the natural ecosystem due to their extreme toxicities to some aquatic species and human health. Several studies were focused for the treatment of these pollutions by application of various methods. Among them, the electro-catalytic oxidation was proposed as a novel advanced treatment technology for the NH_3 and NH_{4+} removal from wastewaters owing to its several advantages such as: degradation of several pollutants types, minimal generation of secondary wastes, easy and rapid performance. In this context, we have studied the direct electrochemical oxidation of NH_3 and NH_{4+} in aqueous solution using an electrochemical system by measurement of cyclic voltammetry (CV), linear sweep voltammetry (LSV) and chrono amperometry (CA). The results suggested that the electro-oxidation of both NH_3 and NH_{4+} was efficient at Pt electrode compared with that performed by the other electrodes materials. However, the presence of chloride ions in the electrolytic medium inhibited the electro-oxidation of NH_3 and NH_{4+}. Thus, the pH variation has affected the oxidation peak relating to the change in the NH_{4+} ionization state. Moreover, the initial NH_{4+} concentration and the applied potential value affected the current intensity of the characteristic oxidation peaks. The ammonia nitrogen (NH_3 and NH_{4+}) concentration was significantly reduced from 100 to 31.039 mg-NH_{4+}/L after an electrolysis time of 60 min and at an applied potential of –0.7 V/saturated calomel electrode (SCE) suggesting that the NH_3 and NH_{4+} were effectively oxidized.