Pyrite (FeS₂) and arsenopyrite (FeAsS) are common sulfide minerals in base metals and precious metals ores and concentrates. The treatment of this kind of ores involves frequently an oxidation stage to improve metal recoveries [1,2]. Besides, the oxidation of these sulfide mineral residues, generates acid mine drainage during weathering [1,3]. The electrochemical characterization using cyclic voltammetry with carbon paste electrodes containing mineral particles (CPE-Mineral) has been an effective tool to demonstrate the overall reactivity of the minerals, at the last decade. In this work, a comparative voltammetric study has been performed on a high purity pyrite mineral (98.8%) and arsenopyrite mineral (content of 88.95% arsenopyrite, 11.84% pyrite), in order to identify the dissolution processes involved on arsenopyrite mineral. This study shows the coexistence effect of minerals, both arsenopyrite and pyrite, and its repercussion on their reactivity. Here cyclic voltammetry technique was used with CPE containing minerals and 0.1M NaNO₃ solution (pH 6.5), as electrolyte. The voltammetric response for CPE-pyrite or arsenopyrite electrodes were obtained on positive and negative direction scans, beginning from open circuit potential (OCP). The potential range was between -2.0 ≤ E ≤ 1.4 V with a scan rate of 0.02 V/s. Cyclic voltammetry on the electrodes shows several oxidation and reduction process. The voltammetric response depends on the initial direction of the scan potential, because some processes are related to the electrochemical oxidation of the mineral. The behavior of the anodic peaks in the pyrite has been widely studied for several authors. These peaks have been associated with the oxidation of the iron sulfides to form oxy-sulfur species (SₓOᵧ, S° and Fe(II) and Fe(III) species [3,5,6]. On the reverse scan, the first reduction peak (at 0 V vs SSE) is associated with the reduction of oxidized species of iron to ferric hydroxides [3,6]. Moreover, in order to identify the processes involved with the pyrite and arsenopyrite oxidation, a study of anodic inversion on the CPE-arsenopyrite electrode was carried out. In this study, the inversion potential was varied in the positive direction, the oxidation of mineral was observed (E₁ = 0.4 to 1.2 V), keeping the negative inversion potential fixed in -2.0 V, the study is shown in the Figure 1. According to literature, it is suggested that arsenopyrite is initially oxidized to realgar (As₄S₄) and Fe(II) in acidic media. Once these species are formed at the interface, the oxidation of As₄S₄ to As₂S₃ can be found to a more anodic potential. Then, the second stage of the oxidation process could be associated to the oxidation of Fe(II) to Fe(III). In the reverse scan, the first reduction peak (G1) is associated with the reduction of oxidized species of iron to ferric hydroxides [3,6].

**References**