DETERMINING TRACE ELEMENTS IN IRON ORE
BY METHODS OF ICP-MS AND XRD

Abstract: A study of trace element of iron ore samples from Tokada Mines in northeastern Liberia in two acid digestion solution using nitro hydrochloric acids HCl: HNO3: 3:1 ratio was undertaken. The elemental composition analysis of the iron ore was carried out using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) techniques and the quantitative phase analysis was carried out using X-Ray Diffraction (XRD) techniques. The major elements in the iron ore include: Fe, Al, Si, Ti and O. Some traces of V, Ni, Zn, Cu, Co, Mn and Y were also present in the result. The effect of contact time, acid concentration, temperature, Particle size and the stirring speed on the dissolution of the iron ore was investigated. The conclusion rate depends on the hydrogen ion concentration and temperature of the reaction system. The mechanism of the reaction appears to follow an exothermic reaction. About 90% of the total iron in the ore was dissolved within 150mins by adding concentrated hydrochloric acid (34-37%) and nitric acid (67-70%) in water solution and 90°C using 0.1mm particle size. The stirring speed was manually carried out at every ten minutes.