

Mass Spectrometry 2017: Leaching of alumina from local clays by hydrochloric, sulphuric and nitric acids precipitation**Inyang V M***University of KwaZulu-Natal, South Africa*

Leaching of alumina from three local clays of ukpor, auchi and udi obtained from different locations in Nigeria was carried out using three different acids (HCL, H₂SO₄ and HNO₃) as precipitants. The leaching process involved preparation of the clay sample, dissolution in acid solution, precipitation of basic aluminium sulphate from the filtrate and the use of EDTA titration method to obtain the alumina yield. The effects of process parameters (acid concentration, particle size, leaching temperature and acid to clay weight ratio) on alumina extraction were investigated. Factorial design of experiment techniques was used in the assessment of the influence of experimental factors on the final results. Clay characterization was also carried out on the different clay samples. The highest yield of 36.96% was obtained from auchi clay with HNO₃ yielding more alumina than HCl and H₂SO₄.

Alumina is an important industrial mineral, which can be used as a catalyst, abrasive and adsorbent. Alumina exists in stable form (α -alumina). Alumina is naturally pure in the form of mineral corundum, although the most important natural mineral for alumina is bauxite. Bauxites have been widely used in industry to produce alumina via the Bayer process. No occurrence of bauxite has been reported in Jordan. One of the alternative sources, however, is Al-rich kaolin, which is a hydrated aluminum silicate (Al₂Si₂O₅(OH)₄) made of mineral kaolinite.

Hydrochloric acid is a colorless inorganic chemical system. HCl is the formula of it. Muriatic acid is another name of it. As it dissociates completely in an aqueous solution, it can attack the skin over a wide range of composition. It is a solution of hydrogen chloride and water, as well as a variety of other chemical species, including

hydronium and chloride ions. It is a natural component of stomach acid produced in the digestive systems of most animal species, including humans. Hydrochloric acid is an important chemical reagent and an industrial chemical, used in the production of polyvinyl chloride for plastic. In households, dilute hydrochloric acid is often used as a descaling agent. Hydrochloric acid is also used in the treatment of leather.

Sulfuric acid is a mineral acid. It is composed of sulfur, oxygen and hydrogen elements. Vitriol oil is another name of it. H₂SO₄ is the molecular formula of it. It is a colorless, odorless and viscous liquid, soluble in water and synthesized in highly exothermic reactions. Its corrosivity can be mainly attributed to its strongly acidic nature and, if at a high concentration, to its dehydrating and oxidizing properties. It is also hygroscopic, easily absorbing water vapor from the air. On contact, sulfuric acid can cause severe chemical burns and even secondary thermal burns; it is very dangerous even at lower concentrations. Sulfuric acid is a very important chemical, and domestic production of sulfuric acid is a good indicator of its industrial strength. It is widely produced with different methods, such as the contact process, the wet sulfuric acid process, the lead chamber process and some other methods. It is most often used in the manufacture of fertilizers, but it is also important in mineral processing, petroleum refining, wastewater treatment and chemical synthesis. It has a wide range of end applications, including in household acid drain cleaners, as an electrolyte in lead batteries, in the dehydration of a compound, and in various cleaning agents.

Nitric acid is a highly corrosive mineral acid. HNO₃ is the molecular formula of it. Acua fortis

and spirit of niter are another names of it. When the solution contains more than 86% HNO₃, it is called fuming nitric acid. Fuming nitric acid is further characterized as red fuming nitric acid at concentrations above 86%, or white fuming nitric acid at concentrations above 95% based on the amount of nitrogen dioxide present. Nitric acid is the main reagent used for nitration - the addition of a nitro group, usually to an organic molecule. While some resulting nitro compounds are explosives sensitive to shock and heat, some are stable enough to be used in ammunition and demolition, while others are even more stable and used as pigments in inks and dyes. Commonly, it is also utilized as a strong oxidizing agent.