PRECIPITATION OF CERIUM CARBONATE WITH ADDITION OF SODIUM CARBONATE INTO CERIUM CHLORIDE SOLUTION

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ABSTRACT

Cerium was one of the most abundant rare earth element. The application of cerium was mostly as catalysts for chemical processing, petroleum refining, catalytic converter, diesel additives and also can reduce emission of industrial gas released. The purpose of this study was to enlarge the size of cerium particle by precipitation method. The large Cerium carbonate was prepared by adding Sodium carbonate into Cerium chloride solution to a Cerium carbonate precipitate. The effects of operational parameter to be studied was method of adding the seed and concentration into the precipitation, while the other was fixed such as temperature at 50ºC, final pH at 5.8, stirring rate at 110 rpm, dosage rate 1.0 ml/min for $CeCl_3$ and 1.5 ml/min for Na_2CO_3, $(Ce_2(CO_3)_3$ seed mass which was 2.5 g and effect of aging at 1 hours after precipitation was complete. There are two methods of seeding precipitation been used to tested the different size of particle enlargement with. 2.5 g of $(Ce_2(CO_3)_3$ was used as seed for both precipitation. Particle size distribution from Malvern particle size analyser show that sample with step-wise precipitation has large size than normal seeding precipitation. Step-wise precipitation shows particle size of d (0.10), d (0.5) and d (0.9) which is 13.41 μm, 41.17 μm and 79.19 μm. The 0.14 M $CeCl_3$ concentration particle size of d (0.10), d (0.5) and d (0.9) which is 8.83 μm, 42.95 μm and 86.45 μm. It could be concluded that step-wise precipitation method at high pH and $CeCl_3$ concentration at 0.14 M show a great potential for enlargement of Cerium carbonate particle more than 40 μm.

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Rare earth elements have a unique character because of particular electron configuration and are said to be the new material treasury due to their properties. Rare earth material has physicochemical characteristics that effect on its application. Formally, the major source of rare earth element is from weathered clay minerals formed through complex physical, chemical, and geobiological processes under natural conditions. The clay mineral act as an inorganic ion exchange resin onto which the hydrated rare earth elements absorb (Shi and Xu, 1999).

In rare earth industry, controlling the physicochemical property index has become the key in industry development. The application effects of rare earth powder are determined directly according to its particle size. Rare earth powder are used in polishing material, ceramic material, fluorescent material, electric material and so on.

Cerium is a rare earth element and has atomic number of 58. Cerium is silvery-white metallic chemical element. Cerium powder polishing efficiency and achievable degree of polishing are determined directly to its particle size. Furthermore, particle size and distribution are very important performance indices for Cerium powder. Large particle of Cerium powder has extensive market application while fine powder has