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Determination Of Rare Earth Elements And Its Distribution Pattern From The Core Sediments By K_0-Instrumental Neutron Activation Analysis

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This work aimed to assess rare earth elements and their distribution pattern from the core sediments from the central coast of Ghana by K_0 instrumental neutron activation analysis. The rare earth element content was evaluated with uncertainty less than 8% (at 95% confidence level) and demonstrated to be accordant with the IAEA-soil 7 certified concentrations. The calculated concentration of light rare earth elements and Fe normalized enrichment factors suggested that sediment samples were not enriched with light rare earth elements (LREEs) obtained from discharges of anthropogenic activities. The chondrite-normalized pattern of rare earth elements exhibited LREEs, Tm, Tb, Eu and Ho enrichment. The total contents of rare earth elements calculated can be used to establish baseline information about environmental contamination determination and to develop the relationships between the Ce/Ce* and Eu/Eu* anomalies and the source appointment of both LREEs elements and heavy rare earth elements (HREEs).

KEYWORDS

Rare earth element, Marine core sediment, Neutron activation analysis, Shale average, Enrichment factor

1. INTRODUCTION

Many years ago, anthropogenic activities have been an important source of trace metallic elements, in the end polluting the surface of the planet earth. These activities overburdened the existence of the environment (aquatic and terrestrial) with a huge amount of trace metallic contaminants. Exploitation and utilization of trace metallic elements in high-value goods and also as the main constituents of infrastructure became a foundation in human development advancement. Therefore, considering the local, national and global scale, human realization and individual responsibility on the ecological constituents to control and improve deteriorated terrestrial and aquatic environments have been intensified [1,2]. Rare earth elements (REEs) are being extensively overexploited because of their escalating request for the manufacture of gadgets including alloy, magnet, glasses, catalyst and assorted electronics [3,4]. The benthic groups are immensely at risk since they assemble the toxic contents in sediments followed by transferring them to the higher trophic level [3,4]. Consequently, the health conditions of living organisms on higher trophic levels of the food chain in terrestrial and aquatic ecosystems will be affected because for instance humans obtained most of their protein sources from aquatic ecosystems [4,5,6].

Assessment among rare earth elements is augmented by normalizing the analyses with chondrite and average shale serving as a reference standard. In such assessments using chondrite or average shale for normalization, certain fractionation impacts may lead to an increase of light rare earth element concentration relative to the heavy rare earth element concentration. Additionally, the rates of normalized significant effects can be calculated [4]. Rare earth elements (REEs) in sediments have been widely employed as important tools for ecological studies owing to their characteristics during geochemical processes. Furthermore, rare earth elements are widely accepted as a depend-