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TRACE ELEMENTAL ANALYSIS OF PERMIAN GONDWANA COALS IN BANGLADESH BY PIXE TECHNIQUE

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ABSTRACT

The study of trace elements level in coal arouses much interest in recent days to assess and evaluate the environmental impact related to its benefit and usage in applying it to the problem of mining site. Further, it is more important during the coal combustion in thermal power stations particularly in relation to the emission of air toxic, disposal and utilization of fly ash. The paper describes the level of nineteen environmentally significant trace elements found in recently discovered Permian Gondwana coals in Barapukuria and Khalaspir of Northwestern Bangladesh using Proton Induced X-ray Emission (PIXE) spectroscopy. Both the mineral species and trace elements are expected to be due to sedimentary and aerobic environmental condition where the Permian coals have been generated depending on their degree of evolution.

Keywords: Bangladesh; bituminous coal; PIXE; trace elements.

1. Introduction

Coal is a physically heterogeneous and chemically complex mixture of organic and inorganic constituents. Trace elements are distributed among the organic and inorganic species in the coal[1-2]. The information on the concentration of the trace elements in the coal is essential for the assessment of possible environmental impact from coal-fired power stations, as coal combustion has been regarded as an important global source of emission of many trace elements to the environment. The data on trace elements in coal is important not only in relation to the emission of air toxic during combustion, carbonization and gasification processes but also to the utilization and disposal of the waste ash[3-5]. Determination of concentrations of particular elements in coal, their homogeneity and mutual correlations are of great importance for possible exploitation. Proton Induced X-ray Emission (PIXE) has been widely used in recent years in performing trace elemental analysis of environmental, biological and medical samples. Goldschnidt[6] first applied spectrographic analysis to study trace elements and their distribution in coal. Details of trace elements in coals have been discussed by Berkowitz[7]. A number of detailed studies on trace element levels in Indian, Australian, Canadian and South African thermal coals have been reported[8-10]. The recently discovered coalmines in the