

Mineralogical and Geochemical Studies of Coal-mine Shale and Characterization of the Pyrolysis-Tar Produced

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The mineralogy, geochemistry, and thermochemical conversion (pyrolysis) of the coal-mine shale (CMS) from Northeast India are investigated with a special emphasis on the possibility of producing liquid fraction (tar). A combined approach using X-Ray diffraction (LTA-XRD), Fourier transform infrared spectroscopy (FT-IR), Scanning electron microscopy (SEM) equipped with an energy-dispersive X-ray spectrophotometer (EDS), X-ray fluorescence spectrometry (XRF), inductively coupled plasma mass spectrometry (ICP-MS), thermogravimetry-derivative and differential thermogravimetric (TG-DTG and DTA) analysis is made to address new information on the mineralogy and geochemistry of a typical coal-mine shale (CMS) sample. The presence of rare earth elements (REE's) is also observed in the coal-mine shale sample. GC-MS analysis of the tar at 600°C illustrates the presence of highly oxygenated organic components (M.W. around 94-108) and high molecular weight (M.W. 256) cyclic sulphur compounds along with the complex N-containing organic sulphur compounds (M.W. around 255-486) in the tar produced.