National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Occurrence of Rare Earth Elements in Coal Mine Discharge: a Case Study from the Makum Coalfield, Assam
Speaker	: Prof. Sk. Md. Equeenuddin
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Venue	: ER 303 Class Room
Date and Time	: 03 Mar 2025 (05:00 PM)
Abstract	: Rare earth elements (REE), comprise of 15 stable elements of the lanthanide series together with yttrium (Y) and scandium (Sc), have been considered as critical raw materials for wide ranges of modern technological applications in different sectors such as electronics, chemical, energy, automotive, and defence industries. However, REE deposits are very limited and only a few commercial deposits are currently being extracted worldwide. Due to the economic importance of REEs and their limited supply have motivated several governments, public and private companies to search for their alternative sources. Over last few decades, coal, associated rocks, fly ash and coal mine discharges have been found to contain high concentration of REEs. Thus, they have been targeted as the potential sites for REEs recovery. Coal mine discharges having low pH has the potential to dissolved more metals, and thus, acid mine drainage (AMD) represents a major environmental problem that coal mining industries are faceting globally. This is formed when the sulphide minerals mainly pyrite, marcasite, pyrrhotite, etc present in coal and overburden are exposed to the atmospheric oxygen and water. The AMD generation is well known at the Makum coalfield, Assam which is one of the largest coal deposits in north-eastern India. However, occurrence of REE in the coal mine discharges and leachate have got little attention. This study reports the preliminary results on REE in AMD from the Makum coalfield. The pH ranges from the 2.77 to 6.85. Total REE concentration (ΣREY) ranges from 2.35 to 5506 µg/L. Coal mine discharges shows MREE enrichment pattern with respect to the NASC. The outlook coefficient, which is often used to evaluate the potential industrial value for REE, varies from 0.88 to 2.24. It indicates that highly acidic coal mine discharges have the promising potential for REE recovery.