Dr. Neeraj Mathur

Date of Birth: 27th April 1963

Current Position: Freelance Consultant (Previously Executive Director (R&D), Oil India Limited)

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Education: I have done M S (five-year integrated course) in Chemistry (GPA 7.95/10.00) from IIT Delhi in 1984, MCA from IGNOU (I Div.) in 2004 and Ph. D. in Geochemistry from Gauhati University in 2014 (https://shodhganga.inflibnet.ac.in/handle/10603/92811).

Experience: Worked at Oil India Limited in various capacities as Research Scientist from August 1985 to April 2023 at R&D Department at Duliajan and Centre of Excellence for Energy Studies at Guwahati, Assam
Previously worked at Shriram Foods and Fertilizers, Delhi from June 1984 to July 1985 as Technical Officer (R&D)

Specialization: I have over 37 years of experience working in petroleum geochemistry at Oil India Limited. My expertise is in integration of geochemical data with geological, reservoir engineering and production inputs to arrive at useful and implementable solutions to exploration and production challenges. I have the requisite expertise to plan, design and execute geochemical studies in my areas of specialization. I have good experience of evaluating the oil shale and the shale oil/gas potential in a basin through geochemical studies. I have considerable experience of setting up and maintaining advanced analytical chemistry laboratory comprising of instruments like Gas Chromatograph-Mass Spectrometer, Gas Chromatograph, Liquid Chromatograph, Rock Eval etc. I also have expertise in analytical method development and NABL accreditation of the laboratories.

Skills: Good project and team management skills. Good teaching skills. Good computer skills (C/C++ and Python). Good command over written and spoken English.

Achievements: As head of the R&D Department at Oil India Limited (2019-2023), initiated several projects on alternate sources of energy like Green Hydrogen, Biohydrogen and Extraction of Geothermal Energy from Abandoned Oil and Gas Wells. Implemented in-house developed technologies like microbial enhanced oil recovery, bioremediation, integration of microbial and surface geochemical prospecting techniques with geological and geophysical data. Also, developed geochemical techniques for understanding continuity in a reservoir using oil fingerprinting.

- Completed several projects with IIT Bombay Centre of Excellence for Oil Gas & Energy (IITB CoE OGE) relating to exploration, production and transportation of hydrocarbons in OIL's oilfields. Collaborated in developing a statistical software package on Alternate Least Squares (ALS) Method for deconvoluting oil mixtures. Guided three Ph. D. students from IIT Bombay as co-PI. Also, completed a collaborative project with CSIR-IIP on wax depositional behavior for pipeline transportation of Assam crude oil. Worked on collaborative projects with RGIPT, Amethi on geomechanics and geochemistry, biostratigraphy and palynology.

- As head of the Centre of Excellence for Energy Studies (CoEES), Oil India Limited, Guwahati (2018-2019) and in different capacities at the Centre earlier (2011-2018), completed projects on Enhanced Oil Recovery studies in Upper Assam. Completed a project on building and calibrating a detailed 3D petroleum system model of Upper Assam

Basin. Completed a project on oilfield formation water analysis (aqueous geochemistry) using ion chromatography. Completed several studies in source rock, reservoir and crude oil geochemistry. The above studies have helped in in enhancing production and giving new exploration leads in OIL's operational areas.

- Set up an ultramodern laboratory at CoEES, comprising of highly sophisticated analytical instruments used for advanced geochemical and petrochemical analysis of oils and source rocks.

- Evaluated the unconventional hydrocarbon resources like oil shale, shale oil and shale gas in Upper Assam Basin using geochemical methods. Developed a technique for using step-wise pyrolysis gas chromatography to determine the maturity level at which a shale will be prospective for shale oil or shale gas. A US Patent has been obtained for this technique.

- Completed projects on natural gas geochemistry using stable carbon isotope studies for gas fields in Assam and Rajasthan.

- Developed a technique for rapid identification of reservoir fluids i.e. oil-bearing zones and prediction of oil type, prior to production testing, through geochemical analysis of sidewall cores. This technique has won the NPMP award for excellence in creativity and innovation. A modification of the technique has been granted an Indian Patent.

- Completed many projects on source rocks studies and oil to oil and oil to source rock correlation studies for various exploration and development portfolios of OIL including Assam, KG Basin, Rajasthan and Gabon.

- Set up a laboratory comprising of highly sophisticated analytical instruments and developed policies and procedures for the NABL accreditation of the laboratory in R&D Department. Maintained the NABL accreditation for several years.

Patents: The following two patents have been granted to me

- US Patent 11,073,504 on Method to Determine Transformation of Kerogen to Oil/Gas at Different Maturities Using Step-wise Pyrolysis-Gas Chromatography
- Indian Patent No. 374653 on Method of Quantification of Low Wax Crude

Honors/Awards: The following awards have been conferred upon me.

- Afro-Asian Association of Petroleum Geochemists and Energy Environment Foundation award in 2021 for Lifelong Contribution Towards Growth and Consolidation of Petroleum Geochemistry and Exploration of Hydrocarbons in India
- Petrofed award for Innovator of the year in 2009 for successful commercialization of the technique for rapid identification of oil-bearing zones and prediction of oil type, prior to production testing, through geochemical analysis of sidewall cores.
- NPMP award for Excellence in Creativity and Innovation in 2001 for developing a technique for rapid identification of oil-bearing zones and prediction of oil type, prior to production testing, through geochemical analysis of sidewall cores.

Professional Affiliations: Member of European Association of Organic Geochemists, Life member of Indian Society of Applied Geochemists and Association of Petroleum Geologists.

Research Publications: I have been actively publishing the work carried out by me during my professional career, in national and international journals and conferences. In addition, I have written a large number of in-house technical notes. Moreover, I have also been reviewing papers for national and international journals. A list of selected publications is attached and also available at https://www.researchgate.net/profile/Neeraj-Mathur-4/research

Linked in Profile: https://www.linkedin.com/in/neeraj-mathur-aa186616/

List of Publications

Papers Published in International Journals

1. Gogoi, M. … Mathur, N. et al. (2021) Organic geochemistry and petrology of the coals in the Laisong Formation, Naga Schuppen Belt, NE India: Inferences on hydrocarbon potential and depositional environment. Geological Journal.
2. Mathur, Neeraj (2014), Tertiary oils from Upper Assam Basin, India: A geochemical study using terrigenous biomarkers. Organic Geochemistry, vol. 76 pp 9-25.
3. Mathur, N., Raju, S. V. & Kulkarni, T. G. (2001), Improved identification of pay zones through integration of geochemical and log data: A case study from Upper Assam Basin, India. AAPG Bulletin, vol. 85, no. 2, pp 309-323.
4. Borah, N. M., Mallick, R. K., Choudhuri, B., Raju, S. V. & Mathur, N. (1998), Formation Evaluation in Lower Eocene Reservoirs in Upper Assam Basin: An Integrated Approach. Society of Petroleum Engineers, SPE Paper 39540, pp 315-332.
5. Raju, S. V. & Mathur, N. (1995), Petroleum geochemistry of a part of Upper Assam Basin, India: a brief overview. Organic Geochemistry, vol. 23 pp 55-70

Papers Published in National Journals

1. Rajak, P. K. … Mathur, N. et al. (2021) Study of Hydrocarbon Source Potential of Kapurdi Lignites of Barmer Basin, Rajasthan, Western India. Journal of Geological Society of India vol. 97 pp 836-842.
2. Pandey, B. … Mathur, N. et al. (2018) A Preliminary Evaluation on the Prospects of Hydrocarbon Potential in the Carbonaceous Shales of Spiti and Chikkim Formations, Tethys Himalaya, India. Journal of Geological Society of India vol. 92 pp 427-434.
3. Singh, P.K., Singh, V. K., Rajak, P.K., Mathur, Neeraj (2017), A study on assessment of hydrocarbon potential of the lignite deposits of Saurashtra basin, Gujarat (Western India). International Journal of Coal Science Technology, vol. 4, issue 4, 310-321.
4. Mathur, Neeraj (2017), Origin, Maturity and Biodegradation of Natural Gases from Upper Assam Basin, India. Journal of Applied Geochemistry, vol. 19, no. 1, pp 1-20.
5. Raju, S. V., Mathur, N. & Sarmah, M. K. (2014), Geochemical characterization of Neoproterozoic heavy oil from Rajasthan, India: implications for future exploration of hydrocarbons. Current Science, vol. 107, no. 8, 25 October 2014, pp 1298-1305.
6. Mathur, N. & Raju S. V. (2014), Oil and Gas Generating Potential of Barail Shales of Upper Assam Basin: Their Prospects as an Oil Shale or Shale Oil Resource. Journal of Applied Geochemistry, vol. 16, no. 1, pp 226-238.
7. Raju, S. V. & Mathur, N. (2013), Rajasthan lignite as a source of unconventional oil. Current Science, vol. 104, no. 6, 25 March 2013, pp 752-757.
8. Mathur, N. & Das, D. N. (2013), Origin and Maturity of Oils from Eocene Reservoirs from a Part of Upper Assam Basin, India. Journal of Applied Geochemistry, vol. 15, no. 1, pp 1-18.
9. Mathur, N. (2012), Pyrolysis Study of Oligocene Coals from Upper Assam Basin to Evaluate their Hydrocarbon Generation Potential. Journal of Applied Geochemistry, vol. 14, no. 4, pp 437-446.
10. Mathur, N. (2010), Geochemical Characterization of Natural Gas Produced from OIL's Operational Area of Upper Assam Basin Using Stable Carbon Isotope Ratio Analysis. ONGC Bulletin, vol 45 no. 1, pp 87-91.

Papers Published in International Conference Proceedings

1. Mathur, N. et al. (2019) Anomalous Thermal Maturity of the Outcrops in the Thrust Belt Area and its Implication to Hydrocarbon Generation in Assam Shelf. Petrotech 2019, Greater Noida.
2. Mathur, N. (2009), Lateral and Vertical Variation in Source Rock Characteristics and its Implication to Oil to Source Rock Correlation: Case Study from Upper Assam Basin. Eighth International Conference and Exhibition PETROTECH 2009, New Delhi.
3. Mathur, N. (2007), Calibration of a 1-D Basin Model for Upper Assam Basin, India. Proceedings of PEGJP07 Present Status and Future Trends in Petroleum Industry, Indian School of Mines, Dhanbad.
4. Mathur, N. (2007), Oligocene Coals as Possible Source of Oils in Upper Assam Basin. Proceedings Seventh International Conference and Exhibition PETROTECH 2007, New Delhi.
5. Mathur, N. (2005), Geochemistry of Oils from Eocene Formation of Upper Assam Basin, India. Proceedings Sixth International Conference and Exhibition PETROTECH 2005, New Delhi.
6. Mathur, N., Das, H. C. & Kulkarni, T. G. (2000), Light Hydrocarbon Geochemistry of Oils from Upper Assam Basin, India. Petroleum Geochemistry & Exploration in the Afro-Asian Region, 5th International Conference and Exhibition, New Delhi, pp 389-393.
7. Mathur, N., Jena, S. K., Das, H. C. & Kulkarni, T. G. (1999), A Novel Geochemical Analysis Technique for the Determination of Reservoir Fluid Types in the Eocene Formation of Upper Assam Basin. Proceedings Third International Conference and Exhibition PETROTECH 99, New Delhi.
8. Mallick, R. K., Raju, S. V. & Mathur, N. (1997), Geochemical Characterization and Genesis of Eocene Crude Oils in a Part of Upper Assam Basin, India. Proceedings Second International Conference and Exhibition PETROTECH 97, New Delhi, pp 391-402.

Papers Published in In-House Magazines

1. Mathur, N. (2017), How Oil Is Formed. In-House Magazine of OIL.
2. Mathur, N. (2015), How Oil is Formed and Stored in Rocks. Souvenir, 30th Indian Engineering Congress, pp 23-25.
3. Satish Kumar, T., Mathur, N. & Das, H. C. (2012), Thermal and Maturity Modelling for (Un) conventional Hydrocarbon Resources Evaluation, Upper Assam Basin, India. Vortex, APG Journal, Vol. III, pp 54-57.
4. Mathur, N. (2008), 1-D Basin Modelling: Case Study from Upper Assam Basin. Petroview: a quarterly journal of DGH, vol. 2, no. 1, pp 9-16.
5. Mathur, N. (2007), Have We Discovered All The Oil in Upper Assam Basin? Petroview: a quarterly journal of DGH, vol. 1, no. 3, pp 7-12.