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Research interests

I am an environmentalist having a special interest in contaminated water and soil treatment. My work on subsurface arsenic remediation without any use of chemicals or waste generation received worldwide acclaim for novelty and sustainability. I have been involved in environmental research with a special focus on low-cost water and wastewater in Asian countries over the past 30 years. During this time, I implemented many groundwater/soil remediation projects in India, Malaysia, Bangladesh, Cambodia, Chile and Mexico. I received numerous awards including IChemE (UK) Ambani prize for outstanding innovation in 2009, St Andrews Prize for the Environment, Times Higher Outstanding Research Team award and UK's sustainability Award in 2010, Energy Globe Award in 2011, Green Apple Award (Irish Champion) in 2012 and Northern Ireland's first all-party development award in 2013. In 2012, I was awarded Officer of the Excellent Order of the British Empire or OBE for Excellence in International Environmental Research and contribution to Higher Education.

Qualifications

7 Aug 1987 → 31 Dec 1989 Doctor of Philosophy, PhD
15 Jun 1984 → 31 May 1986 Executive MBA, PGCM
1 Sept 2001 → 31 Jul 1982 Post Graduate Certificate in Higher Education Teaching, PGCHET
1 Jul 1980 → 30 Jun 1982 Master of Engineering in Chemical Engineering, M.Eng
1 Jul 1975 → 30 Jun 1980 Bachelor of Chemical Engineering, BChE

Employment

Professor

School of Energy, Geoscience, Infrastructure and Society
Heriot-Watt University
1 Oct 2014 → present

Professor

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Research outputs

Development of natural deep eutectic solvent-assisted liquid-liquid extraction method for soap removal from biodiesel: optimization and kinetics

Abed, K. M., Hayyan, A., Hizaddin, H. F., Hashim, M. A., Basirun, W. J., Alanazi, Y. M., Saleh, J., Sen Gupta, B. & M. Salleh, M. Z., May 2025, In: Journal of the American Oil Chemists' Society. 102, 5, p. 931-940 10 p.

Land Use/Cover Dynamics and Associated Impacts on Eutrophication, Land Surface Temperature, and Ecosystem Service Values: An Eco-Climatological Investigation of Chilika Lake, India

Saini, D. S., Mithuna, R., Sen Gupta, B., Saha, A. & Das, B., May 2025, In: Estuaries and Coasts. 48, 3, 84.

Natural Deep Eutectic Solvent Integrated with Bulk Liquid Membrane System for Salicylic Acid Removal from Wastewater

Abed, K. M., Kurji, B. M., Mohsin, O. A., Hayyan, A., Alanazi, Y. M., Saleh, J., Basirun, W. J., Sen Gupta, B. & Amir, Z., May 2025, In: Process Safety and Environmental Protection. 197, 107047.

Natural deep eutectic solvents as a green inhibitor of carbon steel corrosion in sulphuric acid

Abed, K. M., Mohsen, O., Darwesh, T., Hayyan, A., Alanazi, Y. M., Saleh, J., Basirun, W. J. & Sen Gupta, B., May 2025, In: Chemical Papers. 79, 5, p. 2995-3006 12 p.

A novel deep eutectic solvent-based liquid membrane for the extraction of glycerol from crude biodiesel

Hayyan, A., Alhamadi, A. H., Abed, K. M., Ng, Y.-S., Saleh, J., Alanazi, Y., Rahim, S., Hamid, M. D., Hashim, M. A. & Sen Gupta, B., 3 Apr 2025, (E-pub ahead of print) In: Journal of the American Oil Chemists' Society. p. 1-8 8 p.

Soap removal from crude biodiesel using industrial polyols

Shazreen Azmi, M. N., Abed, K. M., Putra, S. S. S., Saleh, J., Alanazi, Y. M., Sen Gupta, B., Hamid, M. D., Hayyan, A., Basirun, W. J. & Mat Salleh, M. Z., 15 Mar 2025, In: Journal of Molecular Liquids. 422, 126972.

Ultrasonic assisted extraction of oil from argan seeds using ionic liquids as novel co-solvent

Hayyan, A., Abed, K. M., Hayyan, M., M. Salleh, M. Z., Wai-Keat, C., Ng, Y.-S., Mohd Nor, M. R., Hizaddin, H. F., Hashim, M. A., Alanazi, Y. M., Saleh, J., Sen Gupta, B. & Syed Putra, S. S., Mar 2025, In: Biomass Conversion and Biorefinery. 15, 6, p. 9463-9473 11 p.

Enhancing the Solubility of Dihomo-gamma-Linolenic Acid Using Natural Deep Eutectic Solvents for Human Tumors Therapy Development

Hayyan, A., Al-Maari, M. A., Abed, K. M., Alanazi, Y. M., Saleh, J., Sen Gupta, B., Kang, D. C. Y., Hizaddin, H. F. & Salleh, M. Z. M., 25 Feb 2025, In: ChemistrySelect. 10, 8, e202405605.

Direct application of tungstosilicic acid hydrate for the treatment of high free fatty acid in acidic crude palm oil and for biodiesel production

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Levulinic acid-based deep eutectic solvent and n-heptane for efficient oil extraction process from rubber seed

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Development of novel API-based deep eutectic solvents for esterification of high free fatty acid

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Treatment of acidic crude palm oil using supported benzenesulfonic acid-based deep eutectic solvents in trickle bed reactor

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A comprehensive study of source apportionment, spatial distribution, and health risks assessment of heavy metal(loid)s in the surface soils of a semi-arid mining region in Matehuala, Mexico

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Mohsen, O. A., Faraj, M. W., Darwesh, T. M., Jawad, N. H., Abed, K. M., Hayyan, A., Alanazi, Y. M., Saleh, J., Sen Gupta, B. & M. Salleh, M. Z., Sept 2024, In: *Results in Engineering*. 23, 102755.

A Chemical and Waste-Free Community Plant for Treating Arsenic-Contaminated Water in Tepul Village, North 24 Parganas, West Bengal

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Performance Evaluation of a Subterranean Arsenic Removal (SAR) Community Water Treatment Plant: A Sustainable Long-Term Approach to Removing Arsenic from Drinking Water

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Source Apportionment of Heavy Metal(loid)s in the Surface Soils of Cerrito Blanco, Mexico: A Comparative Study of Three Receptor Models (APCS-MLR, PMF and UNMIX Model)

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Optimal GIS Interpolation Techniques and Multivariate Statistical Approach to Study the Soil Trace Metal(loid)s Distribution Patterns in the Agricultural Surface Soil of Matehuala, Mexico

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Estimating Source Apportionment of Heavy Metals Contamination in Surface Soil Based on a Positive Matrix Factorization (PMF) Model around Cerrito Blanco in San Luis Potosi, Mexico

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Spatial distribution and source identification of metal contaminants in the surface soil of Matehuala, Mexico based on positive matrix factorization model and GIS techniques

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Removal of copper, lead and zinc from artificially contaminated soil samples using EDTA, rhamnolipids, and soapnut in batch experiments

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Application of response surface methodology for optimizing process parameters for the removal of Pb and Cu by *Acacia Concinna* from contaminated soil

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Remediation of Lead-Contaminated Soil by Using Saponin Derived from *Sapindus Mukorossi*

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Identification of Soil Arsenic Contamination in Rice Paddy Field Based on Hyperspectral Reflectance Approach

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Evaluation of Potential Ecological Risk Index of Toxic Metals Contamination in the Soils

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***Paracyclops chiltoni* inhabiting water highly contaminated with arsenic: water chemistry, population structure, and arsenic distribution within the organism**

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Column Experiment for the Removal of Cadmium, Copper, Lead and Zinc from Artificially Contaminated Soil using EDTA, Rhamnolipids, and Soapnut

Ugwu, E., Sen Gupta, B., Adeloye, A. J. & Martínez-Villegas, N., 5 Mar 2021, In: European Journal of Environment and Earth Sciences. 2, 2, 7 p.

An Investigation on the Lead Removal From Soil Contaminated by Mining and Industrial Wastes Using Soapnut in the Batch Washing Process

Ugwu, E. C., Sen Gupta, B., Meza-Figueora, D., Razo-Soto, I., Esaú Anybal, A.-R. & Martínez-Villegas, N., 1 Feb 2021, In: Journal of Ecological Engineering. 22, 2, p. 1-16 16 p.

A comparative study on effectiveness of soapnut, rhamnolipid and EDTA in cleaning diesel oil contaminated soil from a commercial site in Edinburgh

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Removal of nickel from water using rotating packed bed contactor: Parametric studies and mode of operations

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Enhanced Degradation of Diesel Oil by Using Biofilms Formed by Indigenous Purple Photosynthetic Bacteria from Oil-Contaminated Coasts of Vietnam on Different Carriers

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Statistical analysis and optimisation of coagulation-flocculation process for recovery of kaolinite and calcium carbonate from suspensions using xanthan gum

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Removal of cadmium from contaminated soil using soapnut, shikakai, rhamnolipids and EDTA

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Activities

Laureate, European Environment Foundation

Sen Gupta, B. (Recipient)

25 Mar 2010 → 31 Dec 2020

Prizes

Asia Water Management Excellence Award

Sen Gupta, B. (Recipient), 6 Apr 2010

Energy Globe World Award

Sen Gupta, B. (Recipient), 13 Sept 2012

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