BOOK REVIEWS

Modern Environmental Analysis Techniques for Pollutants. Chaudhery Mustansar Hussain and Rüstem Keçili. Elsevier, Radarweg 29, P.O. Box 211, 1000 AE Amsterdam, The Netherlands. 2020. xiv + 410 pages. Price: US$ 200. Paperback ISBN: 9780128169346 eBook ISBN: 978012816-9353.

One of the major problems we face today is environmental pollution, which is causing grave and irreparable damage to the natural world and human society. Air, soil and water pollution are the most significant threats to living organisms. Concomitant with the whole world competing for a better economy, industrial development led to contamination of the environment by discharges from the burgeoning industries. To deal with these increasing levels of pollutants, most countries established environmental pollution control agencies to monitor, control and mitigate pollution levels. The first and foremost step to controlling pollution is to monitor the entry of pollutants from various point and non-point sources. The major challenge in pollution monitoring is to develop the necessary techniques to identify the contaminant at the most refined possible scale and report the emerging pollutants. These challenges are addressed by developing new methods and introducing new instrumentation techniques to achieve the best possible results in an economically viable manner.

This book is a compilation of various updated environmental monitoring techniques covering air, water and soil pollution. It has been written by two environmental scientists specializing in nanotechnology and environmental instrumentation. As the title suggests, the authors have provided a detailed compilation of modern environmental analytical techniques to characterize the samples for pollutant concentration. The book is divided into 14 chapters; each chapter is sub-divided (typically under five sub-headings) into introduction, detailed methods, instrumentation techniques, conclusion and a detailed bibliography. This structure is followed throughout the book, thus assisting the readers.

In the first chapter, the authors introduce environmental analysis, emphasizing the emerging pollutants, where the life cycle of each emerging contaminant is presented with its sources and the impacts on the environment. Even though the origin and transport of the contaminants are vital topics that need attention, there are covered only in a sub-section. This chapter concludes with risk assessment associated with exposure to pollutants. The second chapter details sample preparation methods for various analytical techniques, especially chromatographic and spectroscopic techniques. The figures in this chapter present the sequence followed in sample preparation. Topics related to scale, accuracy and units are explained in the third chapter. Issues of linearity, accuracy, sensitivity, selectivity, the limit of detection and the limit of quantification are briefly discussed. These topics demand detailed treatment regarding various air, water and soil pollutants. All tables presented in the chapter are fundamental and valuable.

Chapter 4 introduces the sampling techniques of pollutants in air, water and soil without mentioning any special equipment for sample collection. It then discusses sample preparation techniques in detail, emphasizing on the preparation techniques for determining the emerging pollutants. The figures presented in this chapter illustrate the preparation process, while tables 4.1 and 4.2 provide an extensive list of significant pollutants and extraction techniques. Chapter 5 deals with wet qualitative and quantitative chemical analytical methods. This chapter presents compiled information on these techniques with routine schematic illustrations (figure 5.1).

Chapters 6–9 detail the various techniques used for environmental analysis. Chapter 6 discusses the five commonly used spectroscopic techniques (ultraviolet–visible, fluorescence, infrared, Raman and atomic absorption spectroscopies) in pollution monitoring and their application in environmental research. Each spectroscopic technique is explained with a schematic diagram of the principle and detailed information on its functions and application. It will be useful for students and young researchers who want to know the basics of this technique before starting experiments. This chapter is supported with an elaborate list of references which would be helpful for research scholars. Chapter 7 presents various chromatographic techniques used in environmental analysis. It starts with chromatography principles and subsequently moves on to each chromatographic method with detailed illustrations. Information provided in table 7.2 comes in handy as a ready reference. Again, the reference section will help those who want more details on these techniques. Chapter 8 deals with electrochemical methods. This chapter is well supported with detailed illustrations of various sample preparation methods for different targeted compounds (figures 8.2–8.6). Chapter 9 presents a clear view of the emerging techniques for environmental analysis. This chapter introduces the concepts and components of lab-on-a-chip techniques, which are new in the field of study for environmental pollutants. A special mention may be made of the microfluidic techniques and the elaborate table (table 9.1) on the application of this technique in environmental pollution monitoring.

Chapter 10 presents application of various sensor platforms in environmental analysis. Details are provided on the recent methods developed, such as multi-analyte and reusable methods, including spectroscopic, piezoelectric and electrochemical sensors. Chapter 11 deals with the design and development of nanomaterials for environmental pollutant analysis. Here the authors discuss nanoparticles of various kinds and their application in environmental pollutant analysis. Interestingly, this chapter also deals with the drawbacks and technical challenges associated with nanomaterial-based analysis, particularly the toxicity associated with nanoparticles. The authors also provide suggestions for further reading in this section, giving more than 200 references for the chapter.

Chapter 12 addresses quality control and quality assurance in environmental pollutant analysis, which will be useful for analytical laboratories. The way this topic is dealt with across multiple stages of research is lucid. However, figure 12.1 and the associated text are not relevant to this chapter. Since this topic purely falls under statistical methods, offering some case studies could have been more educative.

In chapter 13, the authors have focused on green analytical chemistry. The application of sustainability and green laboratory practices is a relatively new subject, especially in developing countries. This chapter details the various practices and provides 12 fundamental principles of green chemistry;

these recommendations are worth following. The final chapter (chapter 14) discusses the future of environmental analysis regarding the ecosystem, public health and analytical approach. This chapter provides an opportunity for the readers to get a glimpse of the end of analytics, considering the developments in the field.

Overall, this book has many positives and a few negatives. Some of the negatives are: (a) due to the monotonous style, the book feels like a compilation of information from various sources; (b) certain topics are covered with too many surveys that run into several pages without any subheads that would have made reading comfortable (e.g. chapter 6, Raman spectroscopy), and (c) some illustrations are simple and find no relevance (e.g. figures 5.1, 9.1 and 12.1). These shortcomings raise doubts regarding the target audience – students versus researchers.

The many positive features are as follows:

(a) The book gives a general outline of the various techniques for analysing pollutants.
(b) It presents a futuristic view of environmental analysis and introduces many new topics such as nanoparticles-based environmental analysis and green chemistry.
(c) Each selected case is explained with schematic diagrams and a robust literature survey (typically more than 70 per chapter), which help the students and researchers to take to further reading.
(d) The illustrations are simple, self-exploratory and aid in explaining the principles of the techniques.

This can be a helpful resource/reference book for graduate and postgraduate students, research scholars and teachers in environmental science and environmental engineering. Additionally, some selected chapters can be standalone reading material for life science and pharmaceutical science students (e.g. chromatography and green chemistry practices in the laboratory). We recommend this book to libraries of all colleges and universities where environmental science and technology courses are offered.

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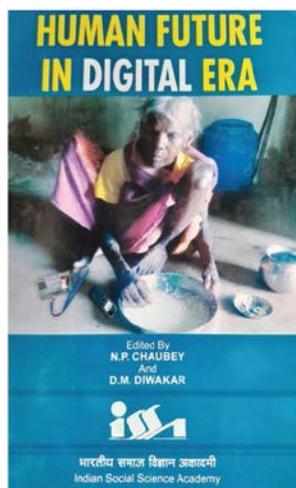
Human Future in Digital Era. N. P. Chaubey and D. M. Diwakar (eds). Indian Social Science Academy, Kalinga Institute of Industrial Technology. Bengaluru. 2022. xiv + 382 pages. Price: Paper back – Rs 500; Hard bound – Rs 800.

Today, most of us in the developed and developing world depend on digital technologies in our daily lives directly or indirectly. It is because these digital technologies have made our lives easier, faster or more efficient. Most urban children are addicted to digital technology and are familiar with social media, smartphones, tablets and internet use. Digital technology is deeply embedded in the way they live and learn. Our smart cities are increasingly dependent on digital technologies like Big Data, the internet of things (IoT) and digital sensors. In 2017, 27 billion devices were connected using IoT. This number is expected to increase to 125 billion by 2030. IoT is an interlacing web of 'smart', physical devices that can be powered on, connected to the internet, and often connected to one another. For society, these devices can include anything from light bulbs to mobile phones, smart TVs, security systems, e-bikes, e-cars, self-driving cars, etc. IoT also exists outside the consumer world. Healthcare, manufacturing, financial services, transportation, telecommunication and other industries connect smart devices to the internet and with each other to power analytics, artificial intelligence and automation. However, there are still many examples of unsuccessful smart devices, like internet-based smart heating systems in cold countries. There is a debate as to whether the digital era contributes significantly to laziness and lethargy and increases health hazards such as obesity and diabetes. At the same time, it

provides relief from the burdens of running errands and doing unnecessarily labour-intensive work. There is also a perception that people are being made redundant as artificial intelligence (AI) is replacing human capital. But the mass unemployment that could arise as a result of replacement is certainly controversial. The replacement of humans with technology is almost always viewed with scepticism. This debate is covered to some extent in this edited volume of 358 pages.

This volume is based on the selected papers which had been presented at the 42nd Indian Social Science Congress (27–31 December 2018) at the Kalinga Institute of Industrial Technology, Bhubaneswar, India, and released at the 45th Indian Social Science Congress in Chennai as a part of Azadi Ka Amrit Mahotsav – the celebration of 75th year of our Independence. The cover page of this edited volume is a photo of a starving lady Mrs Amwa Kunwar – an 80 years old lady with a mobile phone and an identity card. There are some interesting articles by well-known academicians like Vinod K. Gaur, Ashok Jain, B. C. Tripathi, Santosh Kar, S. C. Lakhotia, M. P. Terrence Samuel on the development of the digital era in our country and their positive effects on humans for sustainable growth and development. Ashok Jain has reviewed the development and growth of digitization and its impact on our country's development. There is a possibility of India emerging as a global leader in digital technology, with phenomenal growth in economic and social wealth in general and tremendous growth in the rural economy. A few articles discuss the challenges of digitization on the possible cyber threat, financially fraudulent transactions, paid news and publicity.

This book consists of edited, selected invited manuscripts before the COVID-19 era. Nowhere else has unprecedented and unforeseen growth occurred, as in the digital and e-commerce sectors, which have boomed amid the COVID-19 crisis. COVID-19 has led to a surge in e-commerce and accelerated digital transformation. As lockdowns became the new normal, businesses and consumers increasingly 'went digital'. Goods and services were provided and purchased more online, raising e-commerce's share of global retail trade from 14% in 2019 to about 17% in 2020. There is a nice lesson taught by the COVID-19 pandemic period, 'developing countries should not only be consumers but also be active players and thus producers of the digital global economy'. The prime example