

**Pollution Control Operation Calculation.** D. Velazhagan, Velava Publishers, F1, B-Block, New Castle Apartment, 17/3 Thiruvalluvar Nagar Main Road, Keelkattalai, Chennai 600 117. 2016. 613 pages. Price: Rs 1500.

Today environmental challenges regarding pollution have demanded paradigm shift in strategies for pollution abatement and control to attain sustainable development. The pressing demand for significant economic developments has accelerated industrialization and urbanization, which have resulted in extra burden on our natural environmental resources such as air, water and soil. The Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India (GoI) through Central and State Pollution Control Boards is playing a key role in implementing environmental pollution legislation in the country. Pollution due to industrial activities associated with the generation of bulk quantity of hazardous substances in the form of exhaust gas, wastewater and sludge has serious consequences on the environment. However, the high-priority challenges include conservation of natural resources, ensuring the effective treatment of domestic and industrial wastewater for maintaining river and groundwater quality, management and disposal of solid waste and so on. The intensifying demand on the continual monitoring and thorough understanding of pollution control operation from all stakeholders, such as environmental engineers, environmental scientists, technicians, operation and management personnel, and advisory agencies is indispensable.

Air pollution is due to the release of untreated toxic gases into the atmosphere

which further results in acid rain, increased temperature and associated global warming issues. Particulate matter represents organic, inorganic and biological compounds in the form of solid particles and liquid droplets in the air. Pollutants emanating from industrial power plants and automobiles such as sulphur dioxide ( $\text{SO}_2$ ) and nitrogen dioxide ( $\text{NO}_2$ ) form particulate matter in the atmosphere. The occurrence of particles in the polluted air causes severe health issues such as asthma, chronic obstructive pulmonary diseases and lung cancer. Water pollution is due to the discharge of effluents into water bodies, which change the water properties and reflect severe contamination. Water pollution causes damage to aquatic life, affects the food chain and also causes water-borne diseases. In the present circumstances, the treatment of wastewater discharges is subject to stringent control in almost all the countries.

This book comprehensively deals with pollution control with estimation based on Indian customary units and measurements, especially relevant to air and water pollution. Calculations on accidental release, chemical spillage, quantification of automobile exhaust emission, industrial pollution reduction, estimation of greenhouse gas (GHG) emission and radioactivity-related problems are covered in the book, which makes it a ready reckoner for all practitioners of environmental science. The book has two parts: the first part is on air pollution and the second part is about water contamination. Both parts are divided into different chapters containing essential calculations. The part on air pollution has 14 chapters. The first chapter consists of the general calculations of air pollution, starting right from the core unit conversions. The second chapter includes calculations of unknown fuel combustion, GHGs and their estimation. The third chapter deals with calculations on stack height and dispersion; the estimations are represented using the formula of Carson Moses, Holland, Bryant-Davidson and Brigg. The fourth chapter discusses concentration estimation of carbon monoxide and carbon dioxide emission. The fifth chapter presents emission rates and emission quantity details of  $\text{SO}_2$  and  $\text{NO}_2$  emissions. The air and volatile organic compound (VOC) emissions emanating from metal-melting industrial operations such as

nonferrous metals, lead and brass-copper are included in chapter six. Calculations related to the fugitive gas emissions from accidental and non-point sources such as leakage of oil pipelines, chemical releases, blasting activity, solvent spillage, etc. are covered in chapter seven. Chapter 8 consists of the emission calculations pertinent to mass balance of particulate matter and VOC. Chapter 9 describes the efficiency calculations of air pollution control measures under the topics of collection efficiency, gravity settler, fabric filter, cyclone, electrostatic precipitator, scrubber, absorbers and incineration/thermal oxidizer. Chapter 10 covers the estimation of type of emission of hazardous toxic substances from waste, noxious gas and accidental release. Chapters 11 and 12 cover air emission analysis and noise-level computation. Chapter 13 consists of air emission calculations, while chapter 14 lays emphasis on automobile emissions.

The second part on water pollution consists of 24 chapters. The first chapter comprises general calculations relevant to water pollution. The second chapter deals with computation of flow quantity. Discussions on the calculation of chemical dosages are included in third chapter. Chapter 4 deals with the calculation of weir flow rate and detention. Chapter 5 deals with the calculation of filter beds, screen removal and solar pan and chapter 6 with pumping rate and power usage. Chapter 7 estimates the rate of chemical treatment such as alum dosage, activated silica, activated carbon, etc. Chapter 8 includes the calculation of removal efficiency of wastewater contaminants and reduction rate. Chapter 9 estimates the ratio of food to microorganisms, mixed liquor suspended solids, mixed liquor volatile suspended solids, sludge volume index, mean cell residence time, return of activated sludge and waste activated sludge. Chapter 10 includes calculation related to design of septic tank, oxidation pond, clarifiers, etc. The oxygen transfer rate, aeration tank and operational parameter related calculations are explained in chapter 11. Chapter 12 deals with activated sludge process-related calculations. In chapter 13, calculation of anaerobic digestion related to seed sludge requirement, loading, digester gas production, etc. are discussed. Chapter 14 deals with membrane separation processes like reverse osmosis, electro-dialysis and their membrane area,

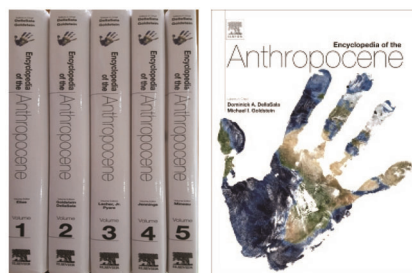
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module numbers, mass balance, power requirement. The wastewater treatment operation and mass balance calculations are dealt with in chapter 15. Chapter 16 discusses sludge treatment operation and composting. The calculations based on analytical, microbiological and hazardous waste are covered in chapters 17–19 respectively. Chapter 20 deals with the calculation of wastewater generated from various industries and processes, while chapter 21 with pollutant mixing with water and land. The reuse of water and cost reduction benefit are explained in chapter 22, while the domestic waste and radioactivity-related calculations are covered in chapters 23 and 24 respectively.

The book consists of 560 solved problems along with detailed solutions that facilitate easy understanding on quantification of pollution control operations. The quantitative calculations, discussed in each chapter envisage the recent developments in pollution control operations. They may help environmental researchers evaluate the pollution levels instantaneously. This book will definitely serve as a valuable reference material for environmental regulators, environmental engineers and engineering students. Realizing the significance of environmental education, GoI has mandated environmental education. This book could act as a ready reckoner for environmental engineering students. It is only one of its kind as a guide to comprehend the various pollution control calculations in the Indian context, but could be used elsewhere as well. The book is highly recommended for both undergraduate and postgraduate students, research scholars, prospectors and the concerned regulatory authorities in the Government.

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**Encyclopedia of the Anthropocene.** Dominic A. DellaSala and Michael I. Goldstein (eds). Elsevier, Waltham MA, Oxford (England), 2018, vols 1–5. 2280 pages. Price: US\$ 4200.

During World War II and in the succeeding decades, there has been unprecedented industrial development, rapid rise in population and related land-use changes, intensification of agricultural activity, indiscriminate disposal of industrial and agricultural waste products, etc. All of these have led to a situation where we realize that the natural ecosystems are changing so fast that the world is no more similar to what we had inherited. The five-volume *Encyclopedia of the Anthropocene* presents state-of-the-art knowledge on various facets of this rapid change that has taken place during the past 70–75 years under various themes – geological history and energy, climate change, biodiversity, ethics and contaminants. This series indeed presents encyclopaedic knowledge on these aspects.

In the first volume on geologic history and energy, Anthropocene is accorded the status of a geological epoch that records a major departure from normalcy. The book identifies the early 1950s as the beginning of the Anthropocene, when industrial and technological advancements grew at a pace similar to human population. The book highlights the advancement of tools, Industrial Revolution (1750–1900), introduction of the atom bomb (1945), as well as introduction of plastics and widespread mechanized agriculture in the developing world (1950) as the events building up to the Anthropocene.

The second volume recognizes climate change as a planetary-scale alteration affecting human and ecological systems. During the Anthropocene, the focus is on anthropogenic climate change, the velocity of which was much faster than what many species can adapt to. Land-use changes along with climate change have

affected the size and distribution in the populations of various species. With time still available to reverse climate change, the book recommends that mitigation and adaptation efforts should go hand-in-hand for an effective climate change strategy. The mitigating steps should include reducing greenhouse gas emissions by switching to renewable energy and storing the atmospheric carbon in ecosystems. Adaptation planning should include conservation of species and human community.

The third volume on biodiversity considers Anthropocene as the beginning of the sixth mass destruction/extinction, with cascading impacts on the functioning of the entire ecosystem. This volume covers the drivers of biodiversity loss that include change, loss and fragmentation of habitat, human population and conflict, and climate change. Activities like agricultural expansion, further accelerated by increasing human population, have driven the levels of consumption of natural resources. Also, anthropogenic climate change impacts all levels of biodiversity, including organisms, populations, ecological networks, ecosystems and biomes. Throughout this volume, climate change is considered to be the big unknown factor affecting the future of biodiversity as it impacts the timing of reproduction of species, development of novel ecological communities, migration of species and other important aspects of biodiversity.

The fourth volume on ethics recognizes that during the Anthropocene, though the quality of life had improved owing to human intelligence and creativity, these human gains have come at the cost of many destabilizing consequences on other forms of geophysical, geochemical and biological ecosystems. The volume comes up with the ethical challenge of the Anthropocene, which is to discover ‘how to use human creativity for betterment in ways that are sustainable, respectful of human dignity and equality and compatible with the value and resilience of all life’. Several articles in this volume analyse the ethical and value dimensions of the relationship between humans and nature on a planetary scale.

The fifth volume on contaminants calls the Anthropocene as the ‘chemical era’ that has seen massive industrialization and development of natural chemicals, proliferation of synthetic chemicals and increased dependence on petroleum