Second Edition

Second Edition

strial and upational

Industrial and Occupational Health

is the thoroughly revised, rewritten and enlarged edition of the book which is a comprehensive resource for occupational health care professionals and a complete guide on the practice of occupational health and safety. The first edition of the book was published in 2017 with 44 topics. The second edition presents a delineated approach to common occupational injuries and illnesses, their preventive and remedial measures, diagnosis and treatment, compensation and rehabilitations as per statutes with 53 topics. The text aims to help the occupational health and safety professionals in understanding and dealing with the complexities of industrial and occupational health and

This book provides detailed information on a wide variety of topics to the occupational health and safety professionals dealing with industrial safety, health and hygiene; work physiology and ergonomics; and industria psychology. Industry-wise health hazards and occupational health case-study reports are also incorporated in this

Containing over 100 illustrations, tables and diagrams, this edition of the book describes the myriad of potential problems in the practice of industrial and occupational health faced by those who have devoted their professional lives to ensure safe and healthy work environments for the workers employed in different industries and occupations.

Special areas of emphasis

- Workplace Health Promotion and Work-site
- Physical Health Hazards in Industry
- Metals in Industry
- Industrial Toxicology
- Occupational Lung Diseases
- Breath Biopsy
- Nanoparticle
- Occupational Dermatoses
- Occupational Cancer
- Industrial Ventilation

- Application Ergonomics at Work
- Evaluation of Physical Fitness at work
- Respiratory Personal Protective Equipment
- Occupational Health Audit
- Occupational Health Case Study
- Major Accident Hazard Control in Industry: **Medical Response**
- **▶** Influence of Occupation on Reproduction
- Medicolegal Aspect of Occupational Health
- Chemical Warfare and Bioterrorism
- Prevention of HIV/AIDS in the World of Work

SK Haldar MBBS, PGD in Public Health

is former Deputy Director General, Directorate General of Factory Advice Service and Labour Institutes, Ministry of Labour and Employment, Government of India. Mumbai, where he worked for over 22 years. He also served as Deputy Principal Medical Officer for more than 11 years at Hindustan Cables Ltd. (PSU), Burdwan, West Bengal. He has more than 33 years of experience in the field of occupational health and safety. He has taken training on occupational safety and health from Occupational Safety and Health Administration (OSHA), under US Department of



Dr Haldar is well experienced in conducting occupational health study and survey. He is the pioneer in the field of occupational health audit in India. He has presented many papers on occupational health at several national and international conferences. He represented India in a conference on asbestosis conducted by United Nation in Bangkok. Besides this, his second book Multiple Choice Questions on Occupational Health and Safety and third book Occupational Health and Hygiene in Industry were also published by CBSPD in 2022 and 2023, respectively.







Haldar





Industrial and Occupational Health

SK Haldar



CBSPD Dedicated to Education **CBS Publishers & Distributors Pvt Ltd**

CBS Publishers & Distributors Pvt Ltd 4819/XI, Prahlad Street, 24 Ansari Road, Daryagani, New Delhi 110 002, India E-mail: delhi@cbspd.com, customercare@cbspd.com; Website: www.cbspd.com

New Delhi | Bengaluru | Chennai | Kochi | Kolkata | Lucknow | Mumbai

Hyderabad | Jharkhand | Nagpur | Patna | Pune | Uttarakhand

Contents

Pre	eface to the Second Edition	vi
Pre	face to the First Edition	$i\alpha$
1.	Introduction to Occupational Health	1
	Prevention of Occupational Health Hazards 9	
2.	History of Occupational Health	18
	History of Occupational Health in India 20 Occupational Health Management System 24	
3.	Environmental Medicine	30
	Environmental Illness 30 Multiple Chemical Sensitivity (MCS) 32 Theories of Immunopathogenesis of MCS 33 Psychological Conditioning Abnormality 34	
4.	Occupational Medicine and its Clinical Aspects	39
	Problem in Diagnosis of Occupational Diseases 39 Evaluation of Patient: History and Physical Examinations 40 Evaluation of Exposure 41 Occupational History 41	
5.	Application of Epidemiology in Occupational Health	52
	Aims of Epidemiology 52 Applications of Epidemiology in the Field of Occupational Health 52 Epidemiological Research 55	
6.	Workplace Health Promotion and Worksite Evaluation	57
	Workplace Health Promotion 57 Occupational Health and Health Promotion 60 Health Promotion Programs in Industry 62 Worksite Evaluation 64	
7.	Industrial Toxicology	70
	Absorption and Distribution of Chemicals 72 Toxicokinetics 73	
8.	Physical Health Hazards in Industry	83
	Industrial Heat and Cold Exposure 83 Heat 84 Cold Injury 106 Industrial Noise 115 Industrial Vibration 160 Ionizing Radiation 166 Nonionizing Radiation 178 Extremely Low Frequency Electric and Magnetic Field (EMF) 184 Barometric Pressure 188	
9.	Metals in Industry	200
	Aluminum and its Compounds 203 Arsenic and its Compounds 206 Beryllium and its Compounds 211 Cadmium and its Compounds 216	

	Chromium and its Compounds 223	
	Cobalt and its Compounds 228	
	Copper and its Compounds 231	
	Fluoride 233	
	Lead and its Compounds 237	
	Manganese 251	
	Mercury and its Compounds 257	
	Nickel and its Compounds 263	
	Phosphorus 267	
	Uranium 269	
10		272
10.	Occupational Lung Diseases	
	Occupational Lung Diseases and Disorders 292	
	Silicosis 292	
	Case Study on Silicosis 307	
	Asbestos-related Diseases 310	
	Coal Worker's Pneumoconiosis 330	
	Pneumoconioses without Fibrosis 335	
	Occupational Asthma 366	
	Byssinosis 373	
	Extrinsic Allergic Alveolitis 381	
	Occupational Lung Cancer 394	
	Pulmonary Effects of Air Pollution 411	
	Pulmonary Effects of Mechanical Injury at Work 419	
	Prevention and Control of Occupational Lung Diseases 431	
11.	Breath Biopsy	438
	Breath Analysis 438	
	Accessing the Metabolite via Breath 438	
	Breath Biopsy for Pulmonary Diseases 439	
12.	Pulmonary Function Test	451
	Importance of Pulmonary Function Test 451	
13	Classification of ILO Radiograph on Pneumoconiosis	476
15.		
	Using the ILO Classification to Classify Digital Radiographic Images of the Chest 480	
	Additional Notes and Recommendations 481	
14.	Nanoparticles	488
15.	Gas, Vapour and Mist in Industry	497
	Carbon Monoxide (CO) 508	
	Hydrogen Cyanide (HCN) 514	
	Hydrogen Sulphide (H ₂ S) 517	
	Methane (CH ₄) 519	
	Carbon Dioxide (CO ₂) 520	
	Chlorine (Cl ₂) 522	
	Phosgene (COCl ₂) 524	
	Hydrogen Chloride (HCl) 526	
	Sulphur Dioxide (SO ₂) 527	
	Ammonia (NH ₃) 528	
	Ozone (O ₃) 530	
	Nitrogen Dioxide (NO ₂) 531	
	Phosphine (PH ₃) 533	
	Methyl Isocyanate (CH ₃ NCO) 534	
	Sulphuric Acid (H ₂ SO ₄) 535	
	Sodium Hydroxide (NaOH) 537	

	Contents	xiii
C1 ' 1		500

16.	Organic Chemicals	539
	Benzene (C ₆ H ₆) (CAS No. 71-43-2) 539	
	Toluene (CAS No. 108-88-3) 542	
	Xylene (CAS No. 1330-20-7, Mixed Isomer) 544 Styrene (CAs No. 100-42-5) 545	
	Carbon Disulphide (CS ₂) (CAS No. 75-15-0) 546	
	Nitriles (Acrylonitrile and Acetonitrile) 548	
	Aromatic Amines (Aniline) 550 Vinyl Chloride (CAS No. 75-01-4) 553	
	Trichloroethene and Tetrachloroethene (CAS No. 79-01-6 and CAS No. 127-18-4) 554	
	Formaldehyde (HCHO) (CAS No. 50-00-0)	
	Phenol (CAS No. 108-95-2) 558 Methylene Chloride (Dichloromethane) (CAS No. 75-09-2) 559	
	Ethylene Oxide (CH ₂ CH ₂ O) (CAS No. 75-21-8) 561	
17.	Occupational Dermatoses	562
18.	Occupational Cancer	576
19.	Occupational Eye Injury	591
20.	Pesticide and its Toxicity	602
21.	Systemic Effects of Workplace Exposures	615
22.	Indoor Air Pollution	634
23.	Industrial Ventilation	649
24.	Evaluation of Physical Fitness at Work	655
25.	Application of Ergonomics at Work	667
26.	Occupational Low Back Pain	677
27.	Cumulative Trauma Disorders	687
28.	Occupational Zoonotic Diseases	693
	Anthrax 694 Brucellosis 695	
	Leptospirosis 696	
	Chlamydophilia Infection 698	
	Q Fever 699 Hantavirus Infection 699	
	Campylobacteriosis 700	
	Rabies and Related Lyssavirus Infection 700	
	Tularaemia 701	
20	Hydatid Disease 701 Psychogogial Hazard at Workplace	704
	Psychosocial Hazard at Workplace Psychosocial Hazard at Workplace	
	Respiratory Personal Protective Equipment Occupational Health Surveillance	716 730
	Occupational Health Audit	730 736
	Occupational Health Case Study	750 750
	Major Accident Hazard Control in Industry: Medical Response	766
	Industrial Hygiene	779
	Biological Monitoring	791

37.	Statutory Provisions of Occupational Health	_ 799
	Medical Provisions under the Factories Act, 1948 and State Rules 799	
	Medical Provisions under the Dock Workers' (Safety, Health & Welfare) Regulation, 1990 814	
	Medical Provisions under Mines Act, 1952 and Mines Rules, 1955 817	
	Medical Provisions under the Building and Other Construction Workers'	
	(Regulation of Empolyment and Conditions of Service) Act, 1966 and Rules, 1998 824	
	Employees' State Insurance Act, 1948 829 ILO Conventions and Recommendations 833	
	The Occupational Safety, Health and Working Condition Code, 2020 837	
38.	WHO Framework Convention on Tobacco Control	847
	Biomedical Waste Management Rules, 2016	- 852
	Human Resource Development Strategy for Occupational Safety and Health	878
10.	HRD Concept 879	_ 070
41.	Modern Concept of Occupational Health Service	884
	Notifiable Occupational Diseases	- 895
	Shift Work in Industry	900
	The Employees Compensation Act, 1923	909
	Occupational Health Nurse	935
	Environmental Pollution and its Management	939
47.	Workplace Substance Abuse	957
48.	Influence of Occupation on Reproduction	970
49.	Medicolegal Aspects of Occupational Health	987
50.	ILO List of Occupational Diseases (Revised 2010)	991
51.	Effects of Occupation on Workers' Health	998
	Occupational Health in Agriculture Industry 998	
	Occupational Health in Petroleum Industry 1006	
	Occupational Health in Construction Industry 1008	
	Occupational Health in Healthcare Service Sector 1011	
	Occupational Health in Plastic Industry 1019	
	Occupational Health in Aviation Industry 1021	
	Occupational Health at High Altitude 1026	
	Occupational Health in Salt Industry 1028	
	Occupational Health in Semiconductor Industry 1029	
	Occupational Health in Biotechnology Industry 1031	
	Occupational Health in Work with Coal Tar Pitch Volatiles (CTPVs) 1034	
	Occupational Health in Rubber Industry 1036	
	Occupational Health in Arc Welding 1037	
	Occupational Health in Mercury Cell House Plant for the Production of Chlorine 1042	
	Occupational Health in Alumina Processing Plant 1043 Occupational Health in Ceramic Industry 1046	
	Occupational Health in Man-made Vitreous Fibers Production 1048	
	Occupational Health in Cement Industry 1049	
	Occupational Health in Foundry Work 1052	
	Caisson and Compressed-Air Tunnel Work 1052	
52.	Prevention of HIV/AIDS in the World of Work	1057
53.	Chemical Warfare and Bioterrorism	_ 1075
	Index	1081