INDUSTRIAL GUIDE TO CHEMICAL AND DRUG SAFETY

T.S.S. Dikshith
Prakash V. Diwan
INDUSTRIAL GUIDE TO CHEMICAL AND DRUG SAFETY
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>xxiii</td>
</tr>
<tr>
<td>Preface</td>
<td>xxv</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>xxvii</td>
</tr>
</tbody>
</table>

## Chapter 1  Introduction to Chemical and Drug Safety  

1. Introduction  
   2. Chemicals and Their Impact  
      - Pesticides  
      - Toxic Chemicals and Eggshell Thinning  
      - Heavy Metals  
      - Endocrine-Disrupting Chemicals  
      - Polychlorinated Biphenyls, Polycyclic Aromatic Hydrocarbons, Dioxins, Toxic Gases, Vapors, and Their Pollutants  
   3. Greenhouse Gases  
   4. Ozone Depletion  
   5. Motor Vehicle–Emitted Pollutants  
   6. Need of the Time  
   7. Conclusion  
   8. References  

## Chapter 2  Principles of Toxicity and Safety  

1. Introduction  
2. History of Toxicology  
   - Hazard and Risk  
   - Branches of Toxicology  
3. The Elements in Toxicology  
   - Pathways of Toxicity  
   - Factors Influencing Toxicity
Chapter 5 Organophosphorus Pesticides

Introduction

Neurotoxicity

Cholinergic Receptor Sites

  Signs and Symptoms of Poisoning
  Neurotoxicity
  Synergism, Antagonism, Additive Effects

Azinphos-Methyl

Carbophenothion

Chlorpyrifos

Coumaphos

Demeton-S-Methyl

Diazinon

Dichlorvos

Dimethoate

Disulfoton

Ethion

Fenamiphos

Fenitrothion

Fenthion

Fonophos

Isophos

Malathion

Methamidophos

Methyl Parathion
Chapter 7  Carbamates  
Introduction 184  
Carbamates 184  
   Aldicarb 184  
   Bendiocarb 186  
   Carbaryl 187  
   Carbofuran 189  
   Methomyl 190  
   Propoxur 192  
   Aminocarb 194  
   Isopropcarb 195  
   Pirimicarb 195  
References 196  

Chapter 8  Synthetic Pyrethroids, Fumigants, and Rodenticides  
Introduction 198  
Synthetic Pyrethroids 198  
   Bifenthrin 199  
   Deltamethrin 200  
   Permethrin 200  
Fumigants 201  
   Phosphine 201  
   Ethylene Dibromide 203  
   Methyl Bromide 203  
   Other Chemicals 204  
Rodenticide 204  
   Strychnine 204  
References 205  

Chapter 9  Industrial Solvents  
Introduction 207  
Aliphatic Hydrocarbons 208  
   Methane 209  
   Ethane 209  
   Propane 209  
   Butane 209  
   n-Pentane 209  
   n-Hexane 210  
   n-Heptane 210
CONTENTS

Aromatic Hydrocarbons 210
  Benzene 211
  Toluene 211
  Xylene 212
  Styrene 212
  Petroleum Products 213
  Crude Oil 213
  Gasoline 214
  Petroleum Ether 214
  Kerosene 215

Aliphatic and Alicyclic Amines 215
  Methylamine 215
  Dimethylamine 216
  Ethylamine 216
  Diethylamine 216

Butylamines 217
  n-Butylamine 217

Allylamines 217
  Allylamine 218
  Cyclohexylamine 218
  Ethylenediamine 219
  Triethanolamine 219

Aromatic Nitro and Amino Compounds 220
  Picric Acid 220
  Aniline 220
  Diphenylamine 221
  4-Aminophenyl Ether 221
  Nitrobenzene 222
  Benzidine 222
  O-Toluidine 222
  O-Nitrotoluene 223
  Dinitrotoluene 223
  Ethylene Glycol Dinitrate 224
  Nitroglycerin 224

Other Organic Solvents 224
  Alicyclic Hydrocarbons 225
  1,3-Butadiene 225
Chapter 10 Food Additives and Food Contaminants

Introduction

Food Additives
  Anticaking Agents
  Antioxidants
  Bleaching and Maturing Agents
  Buffering and Sequestering Agents
  Flavoring Agents and Flavor Boosters
  Food Colorants
  Nonnutritive Dietary Sweeteners
  Nutrient Supplements
  Preservatives
CONTENTS

Food Contaminants 246
  Mycotoxins 246
  Food Allergy 247
  Food Poisoning 247
  Food Storage 248
  Dry Storage of Food 248
  Food Preparation and Management 249
  Food Handling 249

Conclusion 250

References 250

Chapter 11 Industrial Gases and Fumes 252

Introduction 252

Kinds of Gases and Adverse Effects 252
  Ammonia 252
  Carbon Dioxide 254
  Carbon Monoxide 254
  Hydrogen Cyanide 254
  Hydrogen Sulfide 255
  Nitrogen Oxides 255
  Ozone 256
  Phosgene 256
  Sulfur Dioxide 257

References 257

Chapter 12 Drugs: Discovery and Development 259

Introduction 259
  Safety Evaluation 261

Consideration in Toxicity Testing 263
  Choice of Test Animals 264
  Animal Care 264
  Number and Size of Groups 264
  Blood Collection 265
  Termination of Animals 266

Issues Involved in Toxicity Testing 267

New Avenues in Drug Development and Safety 268
  Techniques of Discovery 268
  Proteins as Medicines 268
Chapter 13 Drugs and Human Diseases

Introduction

Analgesics and Antiinflammatory Agents

Aspirin
Paracetamol
Diclofenac

Sedatives, Hypnotics, and Antipsychotics

Drugs Used in Gout

Colchicine
Allopurinol

Vitamins

Vitamin A
Vitamin D
Vitamin E
Vitamin K
Vitamin B₁
Vitamin B₂
Vitamin B₃
Vitamin B₆
Vitamin C

Diabetes

Insulin
Glibenclamide
Acarbose
Troglitazone

Drugs for Malaria

Chloroquine
Quinine
Artemisinin