

# INDEX

## A

- ABCDD care, xvii
- Absorbed dose, xiv
- Absorption
  - definition, xiv
- ACADA. *See* Automatic Chemical Agent Alarm
- Adamsite. *See* Riot-control agents
- Aerosols
  - definition, xii
- AFS. *See* Alternative footwear solution
- Airway. *See* Respiratory system
- Alarms, 147–149
- Alternative footwear solution, 140
- Ambu-bag, 131
- Ammonia, 4–8
- Antidote Treatment Nerve Agent Autoinjectors
  - nerve agents, 65, 77–83, 85
- Antidotes
  - cyanide, 15, 16, 25
  - incapacitating agents, 89
  - lewisite, 60
  - nerve agents, 65, 77
- ATNAAs. *See* Antidote Treatment Nerve Agent Autoinjectors
- Atropine
  - effects of, 94–95, 101
  - nerve agent treatment, 77
- Automatic Chemical Agent Alarm, 147–149

## B

- BAL, 60
- Belladonna, 95, 101
- Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances*, 123
- Body surface area
  - sulfur mustard exposure and, 34–35, 44–45

- Bone marrow
  - sulfur mustard effects, 35, 44, 50–51
- Boots, 140
- Bromobenzyl cyanide. *See* Riot-control agents
- BSA. *See* Body surface area
- BZ. *See* Incapacitating agents

## C

- CANAs. *See* Convulsive Antidote, Nerve Agent
- Cannabinols, 90, 97–98
- Capsaicin, 104–105
- Carbamates
  - nerve agent pretreatment, 83–84
- Cardiovascular system
  - nerve agent effects, 73
  - riot-control agent effects, 109
- Casualty management
  - in contaminated areas, 123–134
  - definition, xvii
- Casualty recognition, xvi–xvii
- Central airway compartment, 3
- Central nervous system
  - incapacitating agent effects, 89–90, 95–96, 100
  - nerve agent effects, 68, 72–73
  - sulfur mustard effects, 35, 39, 51
- Certification of decontamination, 119
- CG. *See* Phosgene
- Chemical agent alarm, 147–149
- Chemical Agent Detector Kit, 144–145
- Chemical agent detector paper, 119, 122, 128, 143–144
- Chemical agent monitor, 119, 121–122, 128, 145–146
- Chemical Agent Water Testing Kit, 149–150
- Chemical agents. *See also* Chemical casualty care
  - absorption of, xiv–xv
  - definition, x

- exposure to, xiv–xv
  - general concepts, x–xii
  - incapacitating agents, xii
  - NATO code, xii
  - physical forms, xii–xiv
  - terminology, x–xii
  - toxic agents, xi–xii
  - toxicity of, xiv–xv
- Chemical casualty care. *See also* Medical management; specific chemical agents by name
- casualty management, xvii
  - casualty recognition, xvi–xvii
  - in contaminated areas, 123–134
  - general principles of, xvi
  - initial management, xvii
- Chemical Casualty Care Division
- website, x
- Chemical warfare agents. *See* Chemical agents
- Chemical Warfare Convention, x
- Chlorine, 4, 6–7
- Chloroacetophenone. *See* Riot-control agents
- Cl. *See* Chlorine
- CN. *See* Riot-control agents
- CNS. *See* Central nervous system
- Concentration-time product, xv
- Contamination zones
- cold zones, 124, 129–130
  - hot zones, 123–129
  - patient decontamination site components, 124–125
  - warm zones, 124–129, 130–131
- Convulsive Antidote, Nerve Agent, 65, 78
- CR. *See* Riot-control agents
- CS. *See* Riot-control agents
- Ct. *See* Concentration-time product
- CWC. *See* Chemical Warfare Convention
- CX. *See* Phosgene oxime
- Cyanide
- clinical effects, 21–22
  - concentration thresholds, 18
  - decontamination, 15, 119
  - detection of, 18
  - differential diagnosis, 23
  - field detection, 15
  - history of, 16
  - laboratory findings, 23–24
  - mechanism of action, 20–21
  - mechanism of toxicity, 19
  - medical management, 15, 24–26
  - military relevance, 16
  - NATO codes, 15
  - nomenclature, 16–17
  - overview, 16
  - physiochemical characteristics, 18
  - protection from, 18
  - return to duty, 27
  - signs and symptoms, 15
  - sources, 17
  - time course of effects, 22–23
  - toxicity of, 20
  - triage, 26–27
- D**
- Decontaminable litter, 151
- Decontamination
- certification of decontamination, 119
  - cyanide, 15, 119
  - decontamination process, 116–119
  - foreign material, 121
  - immediate, 115, 116
  - incapacitating agents, 89
  - individual decontamination, 141–142
  - lewisite, 55
  - nerve agents, 65, 119–121
  - no-touch technique, 119
  - off-gassing risk, 120–121
  - overview, 115–116
  - patient decontamination sites, 123–134
  - patient operational decontamination, 115
  - patient thorough decontamination, 115–116
  - phosgene oxime, 61
  - riot-control agents, 103, 113
  - sulfur mustard, 30, 119–121
  - thickened agents, 120
  - toxic industrial chemicals, 1
  - wound decontamination, 119–122
- Detectors, 142–149
- Diazepam

nerve agent treatment, 77–78, 85  
 Dibenz(*b,f*)(1,4)oxazepine. *See* Riot-control agents  
 Dirty bombs, xi  
 DM. *See also* Riot-control agents  
 clinical effects of, 110–111  
 Dutch powder, 117

**E**

ED<sub>50</sub>. *See* Effective dose  
 Effective dose, xv  
 Emergency medical treatment  
 patient decontamination sites,  
 125–127, 129–131  
 EMT. *See* Emergency medical treatment  
 Erythema  
 riot-control agent injuries, 108  
 sulfur mustard injuries, 36  
 Evacuation. *See* Medical evacuation  
 Exposure  
 definition, xiv  
 Eyes  
 lewisite effects, 58  
 nerve agent effects, 70–71  
 phosgene oxime effects, 63  
 riot-control agent effects, 106–107,  
 112  
 sulfur mustard effects, 35–36, 38,  
 42–43, 46–47, 52

**F**

Fainting, 133  
 Field detection  
 cyanide, 15  
 incapacitating agents, 89  
 lewisite, 55  
 nerve agents, 65  
 phosgene oxime, 61  
 riot-control agents, 103  
 sulfur mustard, 30  
 toxic industrial chemicals, 1  
*Field Management of Chemical Casualties Handbook*, 115, 125  
 Field medical cards, 127, 128, 129  
 FMC. *See* Field medical cards  
 Footwear, 140  
 Fuller's earth, 117

**G**

G-agents. *See* Nerve agents  
 Gastrointestinal tract  
 nerve agent effects, 72  
 phosgene oxime effects, 64  
 riot-control agent effects, 109  
 sulfur mustard effects, 35, 38–39,  
 43–44, 51  
 GCSF. *See* Granulocyte colony stimulating factor  
 GF. *See* Nerve agents  
 GI tract. *See* Gastrointestinal tract  
 Glands  
 nerve agent effects, 72  
 Gloves, 140–141  
 Granulocyte colony stimulating factor, 51

**H**

Haber's law, xv  
 Hallucinogenics. *See* Incapacitating agents  
 HC smoke, 4, 6  
 HD. *See* Sulfur mustard  
*Health Service Support in a Nuclear, Biological, or Chemical Environment*, 116, 123  
 Heat cramps, 133  
 Heat exhaustion, 133  
 Heat injuries  
 prevention at patient decontamination sites, 131–134  
 Heat stroke, 132–133  
 HEPA. *See* High-efficiency particulate air filters  
 High-efficiency particulate air filters, 92  
 Hypochlorite solution, 117, 118–119,  
 121–122

**I**

ICAM. *See* Improved Chemical Agent Monitor  
 ID<sub>50</sub>. *See* Incapacitating dose  
 IDLH. *See* Immediately dangerous to life and health concentration  
 Immediately dangerous to life and health concentration

- cyanide, 18
  - lewisite, 56
  - phosgene oxime, 62
  - sulfur mustard, 32
  - Improved Chemical Agent Monitor, 119, 121–122, 128, 145–146
  - Incapacitating agents
    - clinical effects, 94–96
    - decontamination, 89
    - definition, xii
    - detection of, 92
    - differential diagnosis, 97–99
    - field detection, 89
    - mechanism of action, 93–94
    - medical management, 89, 99–102
    - NATO code, 89
    - nomenclature, 91
    - nonmilitary sources, 91–92
    - physiochemical characteristics, 92
    - protection from, 92
    - return to duty, 102
    - signs and symptoms, 89
    - time course of effects, 97
    - toxicity of, 93
    - toxicokinetics, 93
    - triage, 102
  - Incapacitating dose
    - BZ, 93, 97
    - definition, xv
  - Individual protective equipment
    - alternative footwear solution, 140
    - decontamination of, 115, 130–131
    - detection and alarms, 142–150
    - individual decontamination, 141–142
    - individual protection, 135–141
    - Joint Service Lightweight Integrated Suit Technology, 139–140
    - Joint Service Lightweight Integrated Suit Technology Block 2 Glove Upgrade, 140–141
    - masks, 7, 135–138
    - patient protective equipment, 150–152
  - Integrated suit technology, 139–141
  - Internal dose, xiv
  - IPE. *See* Individual protective equipment
  - Irritants. *See* Riot-control agents
- J**
- JB2GU. *See* Joint Service Lightweight Integrated Suit Technology Block 2 Glove Upgrade
  - JCAD. *See* Joint Chemical Agent Detector
  - Joint Chemical Agent Detector
    - certification of decontamination, 119
    - cyanide, 15
    - nerve agents, 65
    - overview, 146–147
    - phosgene oxime, 61
    - sulfur mustard, 30
    - toxic industrial chemicals, 1
  - Joint Service General Purpose Masks, 7, 137–138
  - Joint Service Lightweight Integrated Suit Technology, 139–140
  - Joint Service Lightweight Integrated Suit Technology Block 2 Glove Upgrade, 140–141
  - Joint Service Personnel/Skin Decontamination System, 141–142
  - Joint Warning and Reporting Network, 147
  - JSGPM. *See* Joint Service General Purpose Masks
  - JSLIST. *See* Joint Service Lightweight Integrated Suit Technology
  - JSPDS. *See* Joint Service Personnel/Skin Decontamination System
- L**
- Lacrimators. *See* Riot-control agents
  - Laryngospasms, 2
  - LCt<sub>50</sub>. *See* Lethal concentration
  - LD<sub>50</sub>. *See* Lethal dose
  - Lethal concentration
    - BZ, 93
    - cyanide, 20
    - nerve agents, 69
    - phosgene oxime, 63
    - riot-control agents, 109
    - sulfur mustard, 34
    - toxic industrial chemicals, 7
  - Lethal dose
    - cyanide, 20

- definition, xv
  - nerve agents, 70, 83
  - phosgene oxime, 63
  - sulfur mustard, 34
  - Lewisite
    - clinical effects, 57–59
    - concentration thresholds, 57
    - decontamination, 55
    - detection of, 56
    - differential diagnosis, 59
    - field detection, 55
    - history of, 56
    - laboratory findings, 59
    - mechanism of action, 57
    - mechanism of toxicity, 56–57
    - medical management, 55, 59–60
    - military relevance, 56
    - NATO code, 55
    - overview, 55
    - physiochemical characteristics, 56
    - protection from, 56
    - return to duty, 60
    - signs and symptoms, 55
    - time course of effects, 59
    - toxicity of, 57
    - triage, 60
  - Lightweight integrated suit technology, 139–141
  - Liquid exposure, xiv
  - Litter, decontaminable, 151
  - LSD-25, 90
  - Lung-damaging agents. *See also* Respiratory system
    - centrally acting, 4–5
    - compartment of action, 4
    - decontamination, 1
    - field detection, 1
    - management, 1, 11–13
    - overview, 1–3
    - respiratory system and, 3–4
    - signs and symptoms, 1
  - Lungs. *See* Respiratory system
  - Lysergic acid diethylamide, 90, 97–98
- M**
- M22 Automatic Chemical Agent Alarm, 147–149
  - M8 chemical agent detector paper, 119, 122, 128, 143–144
  - M9 chemical agent detector paper, 143
  - M272 Chemical Agent Water Testing Kit, 149–150
  - M295 individual decontamination kit, 142
  - M45 mask, 136
  - M50 mask, 137–138
  - M51 mask, 137–138
  - M53 mask, 138
  - M291 skin decontamination kit, 117
  - M256A1 Chemical Agent Detector Kit, 144–145
  - M40A1 mask, 136
  - M42A2 mask, 136
  - Mace. *See* Riot-control agents
  - Masks, 7, 135–138
  - Mass-casualty weapons, xi
  - MCBC. *See* Medical Management of Chemical and Biological Casualties
  - MCU-2A/P mask, 137
  - MCWs. *See* Mass-casualty weapons
  - Medical evacuation
    - from patient decontamination sites, 127, 130
    - sulfur mustard exposure, 53
  - Medical management
    - ABCDD care, xvii
    - cyanide, 15, 24–26
    - incapacitating agents, 89, 99–102
    - lewisite, 55, 59–60
    - nerve agents, 65, 76–84
    - phosgene oxime, 61, 64
    - riot-control agents, 103, 111–113
    - sulfur mustard, 30, 41–44, 46–51
    - toxic industrial chemicals, 1, 11–13
  - Medical Management of Chemical and Biological Casualties, ix
  - Medical treatment facilities
    - patient decontamination sites, 123–134
    - wound decontamination, 119, 122
  - Methylprednisolone
    - toxic industrial chemicals treatment, 12
  - Mid-spectrum agents, xi
  - Military protective mask, 7
  - Mission-oriented protective posture, 125, 130, 139

MOPP. *See* Mission-oriented protective posture

Mouth

riot-control agent effects, 106–107

MTFs. *See* Medical treatment facilities

Musculoskeletal system

injury prevention at patient decontamination sites, 131–134

nerve agent effects, 72

Mustard. *See* Sulfur mustard

## N

NATO. *See* North Atlantic Treaty Organization

Nerve agents

clinical effects, 69–73

decontamination, 65, 119–121

detection of, 67

differential diagnosis, 75

field detection, 65

history of, 66

laboratory findings, 76

long-term effects, 86–87

mechanism of toxicity, 68–69

medical management, 65, 76–84

military relevance, 66

NATO codes, 65

overview, 66

physical characteristics, 66

physical findings, 73

pretreatment, 83–84

protection from, 67

return to duty, 85–86

signs and symptoms, 65

thickened agents, 120

time course of effects, 74–75

triage, 84–85

North Atlantic Treaty Organization

chemical agent codes, xii

cyanide codes, 15

incapacitating agent code, 89

lewisite code, 55

nerve agent codes, 65

phosgene oxime code, 61

riot-control agent codes, 103

sulfur mustard codes, 30

toxic industrial chemical codes, 1

toxic industrial chemical definition, xi

Nose

nerve agent effects, 71

riot-control agent effects, 106–107

NOx. *See* Oxides of nitrogen

## O

OC. *See* Riot-control agents

Occupational Safety and Health Administration, 7, 123, 125

Oleoresin capsicum. *See* Riot-control agents

OSHA. *See* Occupational Safety and Health Administration

Overboots, 140

Overhydration, 133–134

Oxides of nitrogen, 4–7

## P

Patient decontamination sites

ambulatory patient decontamination lane, 127–128

arrival area, 125

components of, 124–130

contaminated waste dump, 127

contamination check area, 128

emergency medical treatment area, 125–127, 129–131

entry control point, 125

evacuation area, 127, 130

heat injury prevention, 131–134

hot line, 129

litter decontamination station, 128

litter patient decontamination lane, 127

musculoskeletal injury prevention, 131–134

rest area, 128

shuffle pit, 129

site critical concerns, 130–134

staff injury prevention, 131–134

staff protection, 125, 129

storage area for weapons and personal effects, 128

supply point, 130

temporary morgue, 127

triage area, 125–126, 129–130

vapor control line, 129

work/rest cycles, 132

zones of contamination, 123–125  
 Patient Protective Wrap Kit, 150  
 PDS. *See* Patient decontamination sites  
 Perfluoroisobutylene, 4–5, 7  
 Peripheral lung compartment, 3–4  
 Peripheral nervous system  
   incapacitating agent effects, 89–90,  
   94–95  
 PFIB. *See* Perfluoroisobutylene  
 Phosgene, 4–9  
 Phosgene oxime  
   clinical effects, 63–64  
   concentration thresholds, 62  
   decontamination, 61  
   detection of, 62  
   differential diagnosis, 64  
   field detection, 61  
   laboratory findings, 64  
   mechanism of toxicity, 63  
   medical management, 61, 64  
   military relevance, 61  
   NATO code, 61  
   overview, 61  
   physiochemical characteristics, 62  
   protection from, 62  
   return to duty, 64  
   signs and symptoms, 61  
   time course of effects, 64  
   toxicity of, 63  
   triage, 64  
 Physostigmine  
   incapacitating agent antidote, 89,  
   100–102  
 PNS. *See* Peripheral nervous system  
 Poison  
   definition, xi  
 PPW. *See* Patient Protective Wrap Kit  
 Pralidoxime chloride  
   nerve agent treatment, 77  
 Protective equipment. *See* Individual  
   protective equipment  
 Pulmonary system. *See* Respiratory  
   system  
 Pyridostigmine bromide  
   nerve agent pretreatment, 83

## Q

3-Quinuclidinyl benzilate. *See* Inca-  
 pacitating agents

## R

Radiological dispersal devices, xi  
 RDDs. *See* Radiological dispersal  
   devices  
 RDIC. *See* Resuscitation Device, Indi-  
   vidual Chemical  
 Reactive Skin Decontamination Lotion,  
   117–118, 141–142  
 Respiratory system  
   compartments of, 3–4  
   lewisite effects, 58  
   nerve agent effects, 71–72  
   phosgene oxime effects, 63  
   riot-control agent effects, 107–108,  
   112  
   sulfur mustard effects, 35–36,  
   37–38, 43, 47–48, 52  
   toxic industrial chemicals and, 3–4  
 Resuscitation Device, Individual  
   Chemical, 131, 151–152  
 Return to duty  
   cyanide exposure and, 27  
   incapacitating agent exposure  
   and, 102  
   lewisite exposure and, 60  
   nerve agent exposure and, 85–86  
   phosgene oxime exposure and, 64  
   riot-control agent exposure and,  
   114  
   sulfur mustard exposure and,  
   51–53  
   toxic industrial chemicals exposure  
   and, 14  
 Riot-control agents  
   clinical effects, 105–111  
   decontamination, 103, 113  
   differential diagnosis, 111  
   field detection, 103  
   history of, 104–105  
   laboratory findings, 111  
   lethality of, 109–110  
   mechanism of toxicity, 105–106  
   medical management, 103, 111–113  
   metabolism of, 110  
   military relevance, 104–105  
   NATO codes, 103  
   oral ingestion of, 109  
   overview, 103–104  
   physical form of, xii

physiochemical characteristics, 105  
return to duty, 114  
signs and symptoms, 103  
time course of effects, 111  
triage, 113

Role 5 care

sulfur mustard exposure, 53–54

RSDL. *See* Reactive Skin Decontamination Lotion

## S

Sarin. *See* Nerve agents

Skeletal muscle

nerve agent effects, 72

Skin

decontamination methods, 117–119  
lewisite effects, 58  
phosgene oxime effects, 63  
riot-control agent effects, 108, 113  
sulfur mustard effects, 35–36,  
41–42, 49–50, 52–53

Soap

skin decontamination method, 118

Soman. *See* Nerve agents

Suit technology, 139–141

Sulfur mustard

clinical effects, 35–39  
compartment of action, 5  
concentration thresholds, 33  
decontamination, 30, 119–121  
detection of, 32–33  
differential diagnosis, 40  
field detection, 30  
history of, 31  
laboratory findings, 40–41  
long-term effects, 45–46  
mechanism of action, 8, 35  
mechanism of toxicity, 33–34  
medical evacuation guidelines, 53  
medical management, 30, 41–44,  
46–51  
military relevance, 31  
NATO codes, 30  
nomenclature, 30  
overview, 31  
physiochemical characteristics, 32  
protection from, 32  
return to duty, 51–53  
Role 5 care, 53–54

signs and symptoms, 30  
thickened agents, 120  
time course of effects, 39–40  
toxicity of, 34–35  
triage, 44–45

## T

Tabun. *See* Nerve agents

TAP. *See* Toxicological agent protective aprons

Tear gas. *See* Riot-control agents

Thermonuclear bombs, xi

Thickened agents

decontamination, 120

TIBS. *See* Toxic industrial biologicals

TICS. *See* Toxic industrial chemicals

TIMS. *See* Toxic industrial materials

TIRS. *See* Toxic industrial radiologicals

Toxic agents

definition, xi–xii

Toxic chemicals

definition, x

Toxic industrial biologicals, xi

Toxic industrial chemicals

centrally acting, 4–5, 6, 8–9

clinical effects, 8–10

decontamination, 1

definition, xi

detection of, 6

differential diagnosis, 10

field detection, 1

laboratory findings, 10–11

mechanisms of action, 8

medical management, 1, 11–13

NATO codes, 1

overview, 1–3

peripherally acting, 5–6, 8, 9

physiochemical characteristics of, 2

protection from, 7

respiratory system and, 3–4

return to duty, 14

signs and symptoms, 1

toxicity of, 7

triage, 13

Toxic industrial materials

definition, x–xi

Toxic industrial radiologicals, xi

Toxicants

definition, xi



- Toxicological agent protective aprons, 127, 128, 129
- Toxidromes, xvi
- Toxins  
definition, xi
- Triage  
categories, xvii  
cyanide, 26–27  
incapacitating agents, 102  
lewisite, 60  
nerve agents, 84–85  
patient decontamination sites, 125–126, 129–130  
phosgene oxime, 64  
riot-control agents, 113  
sulfur mustard, 44–45  
toxic industrial chemicals, 13
- Water testing kits, 149–150
- Weapons of mass destruction  
definition, xi
- Websites  
Chemical Casualty Care Division, x
- White phosphorus smoke, 7
- WMDs. *See* Weapons of mass destruction
- Wound decontamination, 119–122

**Z**

Zyklon B, 16

**U**

- Unconventional weapons, xi
- Underhydration, 133–134
- US Army Medical Research Institute of Chemical Defense  
Chemical Casualty Care Division, x  
*Field Management of Chemical Casualties Handbook*, 115  
Medical Management of Chemical and Biological Casualties, ix  
sulfur mustard treatment, 46–47
- US Army Medical Research Institute of Infectious Disease, ix
- USAMRICD. *See* US Army Medical Research Institute of Chemical Defense

**V**

- Vapors  
definition, xiii
- Vesicants  
decontamination, 119–120  
lewisite, 55–60  
overview, 29  
phosgene oxime, 61–64  
sulfur mustard, 30–55
- Volatility, xiii
- VX. *See* Nerve agents

**W**

- Water testing kit, 149–150

