

INDEX

A

accidents and accident reports

- about, 31–33
- due diligence requirements, 3–5
- investigations of, 4, 31–32
- liability for (See liability, legal)
- near-miss incidents, 32, 55, 233–234
- report form, 32
- report form (template), 233–234
- staff responsibilities, 4, 8, 9, 31, 238
- training in response and reporting, 55
- treatment of injuries (See medical emergencies and treatments)

acetic acid

- neutralization for waste management, 116

acids

- about handling of, 90
- how to dilute concentrated acids, 239–240
- neutralization of, 48, 116
- reactive nature of mineral and water sensitive acids, 121
- spill management of, 47–48, 93–95
- storage of, 99–104, 126–127
- waste management of, 109–110, 116
- See *also* corrosive and toxic substances

aerosols

- waste management categories of, 109–110

aides, laboratory

- See science technicians

Alberta Building Code, 1997

- about requirements of, 12–13, 38

Alberta Education

- human tissues and fluids prohibition, 19
- role in science safety, 6

Alberta Fire Code, 1997

- about requirements of, 12
- on fire extinguisher requirements, 40, 44
- on storage of flammable liquids, 103, 104

Alberta Municipal Affairs

- on facility changes, 44

Alberta Teachers' Association

- Code of Conduct requirements, 4

alcohol burners

- See burners

allergies and allergens

- plants and animals, 66, 68
- student medical information on, 9, 10
- student safety contract on, 231
- See *also* medical emergencies and treatments

aluminum

- precipitation for waste management, 116–117
- See *also* metals

ammonia, household

- storage of, 103–104

ammonium nitrate

- special storage of, 102, 104

animals, live

- as field trip hazard, 68 (See *also* field trips)
- infections from, 61
- not to use wild animals, 19, 20
- use in classrooms, 66–69

animal organs and tissues

- collection of fresh specimens, 68
- use of fresh and preserved specimens, 63–64, 68
- See *also* dissection

aprons, use of, 43

- See *also* personal protective equipment

asbestos

- avoidance of, in protective equipment, 42, 43
- OHS code of practice required, 84

assistants, laboratory

- See science technicians

autoclaves

- cleaning and maintenance of, 69
- how to use, 242

B**bacteria**

- See micro-organisms

baking soda

- for chemical spills, 48
- storage of, 103–104

ballistic pendulum experiments

- safety measures for, 72

bases

- about, 90
- how to dilute concentrated bases, 239–240
- neutralization of, 116
- reactive nature of water sensitive bases, 121
- spill management of, 47–48, 93–95
- storage of, 99–104, 127
- waste management of, 116
- See *also* corrosive and toxic substances; spills of toxic and corrosive substances

- batteries**
 - short circuit hazards, 74
 - See *also* electricity and electrical hazards
- beaker tongs**
 - use of, 43
- bentonite**
 - for chemical spills, 47
- bibliography on science safety, 245**
- biological hazards, 61–69**
 - about biological and chemical hazards, 61
 - about cleanliness guidelines, 68–69
 - legislation on, 13–14
 - on field trips, 68
 - prohibition on use of human tissues and fluids, 62
 - TDG hazard classes for, 127–128
 - use of centrifuge, 66
 - use of fresh and preserved specimens, 63–64, 68
 - use of inoculating loops, 66
 - use of micro-organism cultures, 62–63
 - use of mouth in science activities, 65
 - use of owl pellets, 63
 - use of scalpels, 72, 242
 - use of syringes, 66
 - waste disposal, 48 (See *also* waste management and disposal)
 - waste disposal of sharps, 47
 - WHMIS hazard classes, 126
 - WHMIS hazard symbol for, 106–107
 - See *also* edible substances; housekeeping
- biological hazard waste brokers**
 - See waste brokers and facilities
- bleach**
 - labels for, 109
 - See *also* oxidizing materials
- bleeding and cuts**
 - accidental infections from, 61–64
 - emergency treatment for, 29
 - use of cutting tools, 72
 - See *also* infectious material; medical emergencies and treatments
- blood, human**
 - prohibition on use of human fluids, 19, 20, 62
- bottles**
 - how to remove glass stoppers, 241
- bovine tissues**
 - cautions on use of, 64

brokers, waste

See waste brokers and facilities

bromine

chemical treatment for waste management, 118

burners

about use of, 75–77

how to light Bunsen burners, 239

how to make flame visible in alcohol burners, 239

use on glass tubing, 240

burns

emergency treatment of, 30

heat hazards and, 75–77

from nonionizing radiation, 80–81

See also heat; medical emergencies and treatments

bylaws, municipal

on rocketry, 77–78

on waste management and disposal, 17, 56–57, 111–112

staff training on waste disposal under, 56–57

Web sites for, 243

C**Calgary, City of, bylaws**

See bylaws, municipal

Canada Water Act

requirements under, 16

Web site, 243

Canadian Association of Rocketry, 77, 78**Canadian Environmental Protection Act, 1999**

requirements under, 16

Web site, 243

Canadian Radiation Emitting Devices Regulation, 82**candles**

use of, 77

carbon

storage of, 103–104

See also flammable and combustible materials

carbon dioxide, solid (dry ice)

chemical hazards of, 91–92

carbon paper

hazards from use of spark timers, 74

carcinogens

avoidance of, 87, 89

information on, in MSDSs, 86

cardiopulmonary resuscitation (CPR)

staff training in, 28

See also first aid

cartridge burners

use of Primus and butane, 76–77

See *also* burners

cathode ray tubes (CRTs)

hazards of, 80

cells, cheek

prohibition on use of human tissues, 62

centrifuging

use of, 66

charcoal

storage of, 103–104

See *also* flammable and combustible materials

chemicals and chemical hazards, 83–95

about chemical hazards, 86–90

about safe use of, 83, 90–91

about specific chemical hazards (See chemical hazard information table)

carcinogens, 89

cryogenic substances, 91–92, 103

instructional strategies to reduce risks, 52–53, 113–114

inventory of (See chemical inventories)

labelling of (See labels)

legislation on use of, 12, 14–15

material safety data sheets (MSDSs) on, 84–86 (See *also* material safety data sheets)

NFPA hazard ratings, 124–126

OHS code of practice for, 14, 84

reactive nature of, 120–121

spill management of (See spills of toxic and corrosive substances)

storage of (See chemical storage)

training in use of (See training in science safety)

transportation of (See Transportation of Dangerous Goods)

treatment for injuries by, 28–29

unknown chemicals, treatment of, 109–111

waste management of (See waste management and disposal)

WHMIS hazard classes for, 126 (See *also* Workplace Hazardous Materials Information System (WHMIS))

See *also* acids; bases; corrosive and toxic substances

chemical hazard information table

about the table, 119–129

alphabetical list of chemicals, 130–227

chemical inventories

about setting up an inventory, 104–106, 235

sample template for, 235

science technicians' roles in conducting, 9

updating after receiving chemicals, 99

updating of MSDSs during, 86

waste inventory, 109–111

chemical storage

- about chemical storage, 99–104
- about reactive nature of chemicals, 120–121
- about storage of specific chemicals (See chemical hazard information table)
- fire code requirements, 12
- fire extinguisher requirements for, 44
- how and what to order, 97–99
- how to dispense, 113
- how to receive orders of, 99
- how to weigh, 241
- inventories of (See chemical inventories)
- labels, 106–109 (See *also* labels)
- safety inspection of, 49, 232
- safety standards for facilities, 39
- separation of edibles from chemicals, 99
- shelf life of chemicals, 98, 111
- storage schemes in, 99–104
- waste storage, 109–110 (See *also* waste management and disposal)

chemical waste brokers

- See waste brokers and facilities

city bylaws

- See bylaws, municipal

Clarification of Statements Prohibiting the Use of Human Body Substances in the Alberta Science Curriculum*, 62*classroom teachers**

- See teachers, science

classrooms, science

- See elementary school science programs; science laboratories; secondary school science programs

clean-ups after procedures

- See hand washing; housekeeping

coal

- use as boiling chips, 240

coats, lab, 43

- See *also* personal protective equipment

cobalt

- precipitation for waste management, 116–117
- See *also* metals

code of practice, OHS

- requirement for, 14, 84

combustible materials

- See flammable and combustible materials

compressed gases

- about emergency response to leaks, 27–28
- as controlled products, 129
- cryogenic substances, 91–92, 103
- storage and handling of, 92, 103–104
- WHMIS hazard class, 126
- WHMIS hazard symbol for, 106–107
- WHMIS labels for, 108
- See also* controlled products

consumer products

- hazards of consumer restricted products, 109
- how to store, 99, 103
- not under WHMIS system, 106

contact lenses

- use of, in student safety contract, 231
- See also* eyes, care of

controlled products

- about, 106, 129
- consumer products as, 99
- under *Hazardous Products Act*, 18
- labelling of, 106–109
- training in management of, 54–55
- WHMIS requirements for, 15, 18, 106
- See also* Workplace Hazardous Materials Information System (WHMIS)

copper

- precipitation for waste management, 116–117
- See also* metals

copper sulfate

- reuse of, 114
- storage of, 103–104

corrosive and toxic substances

- about hazards of, 86, 90–92
- NFPA hazard ratings, 124–126
- poisonous substances (*See* poisonous materials)
- reactive nature of, 120–121
- spill management of, 47–48, 93–95
 - (*See also* spills of toxic and corrosive substances)
- storage of, 100–104, 120–121
- TDG hazard classes for, 127–128
- waste management of, 109–110 (*See also* waste management and disposal)
- WHMIS hazard classes for, 126
- WHMIS symbol for, 106–107
- See also* chemicals and chemical hazards; controlled products

cryogenic substances

- chemical hazards of, 91–92
- storage of, 103

cultures of micro-organisms

hazards of, 62–63

prohibition on use of human tissues and fluids, 62

See *also* biological hazards

cuts and bleeding

See bleeding and cuts

cutting tools

about safe use of, 72

how to use scalpels, 242

sharps disposal, 47

D**dehydrating agents**

use of, 90

See *also* corrosive and toxic substances

departments, science

See secondary school science programs

diatomaceous earth

for chemical spills, 47

disposal of hazardous waste

See waste management and disposal; waste brokers and facilities

disposal sites

See landfills and sewers

dissection

about use of fresh and preserved specimens, 63–64, 68

how to use scalpels, 72, 242

not for elementary school programs, 19

prohibition on use of human tissues, 62

sharps disposal, 47

distillation

for recycling used solvents, 115

drain cleaners

labelling of, 109

drains, municipal

See landfills and sewers

drinks and food

See edible substances

dry ice (solid carbon dioxide)

chemical hazards of, 91–92

due diligence

requirement for staff to use, 3–5

training of staff in, 55

See *also* liability, legal

dumps

See landfills and sewers

E

ears and hearing

sound hazards for, 78

ecostations

not for school waste disposal, 112

edible substances

about use and storage of, 58, 68, 90

legislation on, 14

storage of, as separate from chemicals, 99, 102

storage of, in lab safety inspection checklist, 232

student safety contract on, 231

student safety rules on, 229

use of mouth in science activities, 65

Edmonton, City of, bylaws

See bylaws, municipal

education students

See students, education

educational assistants

roles and responsibilities of, 10

electric hot plates

use of, 76

electricity and electrical hazards

about electrical hazards, 73–76

building code electrical standards, 13, 38

fire extinguishers' use on electrical fires, 45

hazards of flammable materials, 93

radiation hazards from electronics, 79 (*See also* radioactive materials)

student safety rules on, 229

use of batteries, 74

use of electromagnets, 72

use of electrostatic generators, 74–75, 241

use of high voltage equipment, 74

use of spark timers, 74

elementary school science programs

about general safety procedures for, 18–20

categories of chemicals for (in chemical hazard information table), 122–123

instructional strategies, 52–53, 113–114

storage schemes and systems for, 99–104

student safety contract, 20, 230

emergency preparedness and response plans, 23–33

about, 23–26

due diligence requirements, 3–5

fire drills and fire dept. access, 12

for fires, spills and gas leaks, 27–28, 30 (*See also* spills of toxic and corrosive substances)

required under OHS Code, 14–15, 23

safety inspections, 23, 49

safety inspections (checklist), 232

Web sites on, 26

See *also* accidents and accident reports; medical emergencies and treatments

environmental protection

about EPEA requirements, 16, 56–57, 112

about responsibilities for, 112

due diligence requirements, 3–5

Web site for EPEA, 243

See *also* recycling and recovering of substances; waste management and disposal

Environmental Protection and Enhancement Act (EPEA),

16, 56–57, 112, 243

environmental sites for field trips

risk management strategies for, 53–54

See *also* field trips

Epsom salts

storage of, 103

ethanol

recycling of used, 115

storage of, 103–104

explosive substances

about hazards of, 93

cryogenic hazards, 91

emergency response to gas or propane leaks, 27–28

handling and storage of, 120

legislation on, 106, 109

NFPA hazard codes for, 124–126

reactive nature of special-case organic substances, 121

TDG hazard classes, 127–128

See *also* compressed gases

eyes, care of

about treatment for injuries to, 28–29

eyewash stations, 37, 39, 41

goggles for, 42, 72, 73

student safety contract on, 231

UV filtering sunglasses for, 43, 81

visible light and laser hazards, 81

See *also* light; personal protective equipment

F

face shields

use of, 42

See *also* personal protective equipment

fainting and shock

emergency response to, 30

See *also* medical emergencies and treatments

field trips

about risk reduction for, 46, 53–54

biological hazards of, 68

first aid kits for, 45–46, 53, 68

fires and fire prevention

- about emergency response to fires, 27–28, 30
- about use of fire extinguishers, 44–45, 238
- burning clothing, 30
- in chemical laboratory safety inspection checklist, 232
- chemical storage schemes to prevent, 101 (*See also* chemical storage)
- electrical hazards, 73–76 (*See also* electricity and electrical hazards)
- fire blankets, 30, 42
- fire detectors in science facilities, 37
- fire drills and fire dept. access, 12, 13
- instruction in location of fire exits, 238
- legislation on, 12–13, 24, 103, 104
- legislation on fire extinguishers, 13, 40, 44
- MSDS information on, 85
- NFPA Hazchem Code for hazards, 124–126
- student safety contract on, 231
- See also* flammable and combustible materials

first aid and first aid kits

- about, 45–47, 53
- about emergency medical treatments, 28–31
- for field trips, 45–46, 53, 68
- kits in science classrooms and chemical storage areas, 40, 101
- labels with information on, 107
- legislation on, 13, 15, 28, 53
- MSDS information on, 86
- on chemical laboratory safety inspection checklist, 232
- science department policies and procedures on, 238
- staff responsibilities for, 7, 8, 31
- staff training in, 28–31, 55
- student safety contract on, 231
- See also* accidents and accident reports; medical emergencies and treatments

first aid and first aid kits

- about, 45–47, 53
- about emergency medical treatments, 28–31
- for field trips, 45–46, 53, 68
- kits in science classrooms and chemical storage areas, 40, 101
- labels with information on, 107
- legislation on, 13, 15, 28, 53
- MSDS information on, 86
- on chemical laboratory safety inspection checklist, 232
- science department policies and procedures on, 238
- staff responsibilities for, 7, 8, 31
- staff training in, 28–31, 55
- student safety contract on, 231
- See also* accidents and accident reports; medical emergencies and treatments

flammable and combustible materials

- about use of, 93–94
- cryogenic substances as hazards for, 91–92
- electrical equipment hazards for, 74
- Hazchem code for, 125
- how to heat flammable liquids, 241
- NFPA hazard ratings for, 124–126
- reactive nature of special-case organic substances, 121
- spill management of, 94
- storage of, 93–94, 99–104, 127
- storage of waste, 109–110
- TDG hazard classes, 127–128
- use of fire extinguishers on, 45
- WHMIS hazard class for, 126
- WHMIS symbol for, 106–107
- See also* controlled products; explosive substances; fires and fire prevention

food and drinks

- See* edible substances

formaldehyde and formalin

- hazards of, 63–64, 111

fume hoods

- use of, 38, 39, 42

fungi

- safety procedures for cultures, 62–63
- See also* biological hazards

funnels

- for microscale experiments, 113

G**garbage sites**

- See* landfills and sewers

gases

- about emergency response to leaks, 27–28
- cryogenic substances, 91–92, 103
- disposal of atmospheric gases, 129
- NFPA standards for storage cabinets for, 93
- from rockets (*See* rocketry hazards)
- TDG hazard classes, 127–128
- See also* compressed gases

generators

- about use of, 74–75
- avoiding electrical charge build-ups, 241

glasses, eye

- contact lenses use in student safety contract, 231
- use of UV filtering glasses, 43, 81
- See also* eyes, care of; personal protective equipment

glassware

- about use of, 72
- disposal in separate waste containers, 47

- how to cut glass tubing, 240
- how to insert or remove stoppers, 240
- how to shake test tubes, 242
- mercury hazards of thermometers, 88
- special sizes for microscale experiments, 113
- use of heat resistant, 75
- use of test tube holders, 75

gloves

- about use of, 43, 58
- for dissection, 64
- in first aid kit, 46
- for handling heated objects, 75
- for protection from animals, 66
- for protection from cryogenics, 92
- for protection from mercury, 88
- for protection from nonionizing radiation, 81
- for spill cleanups, 47, 48, 115
- for spills of biohazard materials, 63–64, 94
- See *also* personal protective equipment

glucose

- storage as general substance, 103–104

glycerine

- storage of, 103

glycol

- waste management categories of, 110

goggles, protective, 42

- See *also* eyes, care of; personal protective equipment

Guide to Education

- prohibitions on use of human tissues and fluids, 19

H

halogens

- handling and storage of, 121
- hazards of, 90
- storage of, 126–127
- See *also* corrosive and toxic substances

hand washing

- facilities in science classrooms, 41
- in science safety rules, 20, 21, 229
- in student safety contract, 230–231

hands, protection of

- See gloves; personal protective equipment

hazard ratings, NFPA, 124–126

Hazardous Products Act (Canada)

- controlled products, 12, 18
- Web site, 243

- See *also* controlled products

hazardous waste disposal

- See waste management and disposal

Hazchem Codes

NFPA hazard ratings, 124–126

Hazorb spill control pillows, 47, 94**health emergencies and treatments**

See medical emergencies and treatments

Health of Animal Regulations, 64**hearing**

sound hazards for, 78

heat

about heat hazards, 75–77, 90

heat detectors in science facilities, 37

heat resistant glassware, 72

heat resistant gloves and tongs, 43

how to boil liquids without “bumping,” 240

how to heat flammable liquids, 241

See also burns; sterilization

heavy metal salts

precipitation for waste disposal, 116–117

Heimlich maneuver

staff training in, 28

See also first aid

high voltage equipment

hazards of, 74–75

See also electricity and electrical hazards

hoods, fume, 38, 39, 42**hot plates**

use of, 76

housekeeping for clean-up of non-toxic substances

equipment in facilities, 39

in lab safety inspections, 49, 232

science safety rules on, 229

special cautions in biology, 68–69

storage of consumer products, 99, 103

student cleanup after follow-up procedures, 20, 21

student safety contracts on, 230–231

See also edible substances

human tissues and fluid specimens

prohibition on use of, 62

hydrochloric acid

waste management by neutralization, 116

hydrogen, liquid

See compressed gases

hydrogen peroxide

explosive substance risks of, 93

labelling of hazards, 109

storage of, 103

I

ice

- not to use as burn treatment, 30
- storage of, 103
- See *also* refrigeration

ice, dry (solid carbon dioxide)

- hazards of, 91–92

infectious material

- about accidental infections, 61–64
- prohibition on use of human tissues and fluids, 62
- TDG hazard classes for, 127–128
- use of disinfectants, 69
- WHMIS hazard class for, 126
- WHMIS hazard symbol for, 106–107
- See *also* biological hazards

information table, chemical hazard

- See chemical hazard information table

inoculating loops

- use of, 66

inorganic acids

- storage of, 103, 126–127

inspections

- about general safety inspections, 23
- legislation on, 4, 13, 31, 56
- of accidents and accident reports, 31
- of employment conditions, 13
- of fire extinguishers, 45
- of fume hoods, 42
- of TDG training records, 56
- safety inspection of chemical laboratories, 49
- safety inspections of chemical laboratories (checklist), 232

instructional strategies

- for reduction of risks, 52–53, 113–114
- See *also* safety equipment

inventory of chemicals

- See chemical inventories

iodine

- chemical treatment for waste management, 118
- storage of, 103–104

iron

- precipitation for waste management, 116–117
- See *also* metals

isolation transformers

- use of, 74–75

J

junior high schools

- See secondary school science programs

L

lab stations

- for instruction, 52, 114
- See *also* instructional strategies

labels

- about use of, 106–109
- legislation on, 12, 15, 18
- liability for improper or omission of, 109
- on chemicals as safety measure, 90
- on controlled products, 18
- on recovered substances, 114
- on waste containers, 47, 48, 109
- student awareness of, 58
- TDG labels, 17, 109
- WHMIS requirements for, 15
- WHMIS symbols and labels, 106–107

laboratories, science

- See science laboratories

laboratory coats

- use of, 43

laboratory technicians

- See science technicians

Labour Relations Code (Alberta)

- employment conditions under, 13
- Web site, 243

landfills and sewers

- about disposal in, 112
- as a disposal method (in chemical hazard information table), 129
- disposal of alcohol-based specimens in, 64
- disposal of aqueous solutions in, 115
- disposal of radioactive substances in, 79
- disposal of sulfides in, 118
- legislation on disposal in, 16, 17, 56, 111, 243
- See *also* waste management and disposal; waste brokers and facilities

lasers

- use of, 81–82

lead salts

- precipitation for waste management, 116–117

leaks and spills of non-toxic substances

- See housekeeping

leaks and spills of toxic substances

- See spills of toxic and corrosive substances

learning strategies

- for reduction of risks, 52–53, 113–114
- See *also* safety equipment

legislation on safety, 11–18

about legislated requirements, 11–12

Alberta Building Code, 12–13, 38

Alberta Fire Code, 12, 40, 44, 103, 104

Canada Water Act, 16

Environmental Protection and Enhancement Act (EPEA), 16, 56–57, 112

Guide to Education, 19

Hazardous Products Act, 12, 18

Labour Relations Code, 13

Occupational Health and Safety Act, 4, 7, 13–14, 31, 99

Occupational Health and Safety Code, 13, 40, 45, 55, 78, 243

School Act, 15

Teaching Profession Act, 15–16

Transportation of Dangerous Goods Act (Alberta), 16–17, 127, 243

Waste Control Regulation, 16, 111

Workers' Compensation Act, 31

Web sites for copies of, 243

See also bylaws, municipal; liability, legal

liability, legal

legislation, 3–4

light

about hazards of, 81–82

levels in secondary science labs, 36

as nonionizing radiation, 80–81

See also eyes, care of

liquids and solutions

about hazards of corrosive and toxic, 90–92

evaporation of, for waste management, 115

how to dilute concentrated acids or bases, 239–240

how to pour into funnel filters, 239

how to prevent uneven boiling (bumping), 240

spill management of, 47–48, 94–95

(See also spills of toxic and corrosive substances)

See also flammable and combustible materials; spills of toxic and corrosive substances; water

local bylaws

See bylaws, municipal

M

machinery

rotating machinery as hazard, 71

magnesium ribbon

dispensing of, 113

as source of UV radiation, 81

magnets

use of, 72

manganese

precipitation for waste management, 116–117

See *also* metals

marine pollutants

TDG hazard classes for, 127–128

material safety data sheets (MSDSs)

about material safety data sheets (MSDS), 15, 84–86

in chemical inventory, 105–106, 235

disposal of chemicals without, 111

requirements under OHS Code, 15

substances excluded from, 106, 109

training in, 54–55

as WHMIS requirement for controlled products, 18

medical emergencies and treatments

about emergency response plans, 24, 28–29

allergies (See allergies and allergens)

infections (See infectious material)

NFPA hazard ratings, 124–126

poison and drug information services (contact info), 29, 31

(See *also* poisonous materials)

student medical information for, 19, 20, 31, 66, 68, 231

treatments, 28–31

See *also* accidents and accident reports; emergency preparedness and response plans; liability, legal

mercury

special hazards of, 87–88

waste management of, 109–110

metals

precipitation of heavy salts for waste disposal, 116–117

reactive nature of acid sensitive, 120

storage of metal powders, 103–104

use of fire extinguishers on combustible metals, 45

waste management of mercury, 109–110

WHMIS hazard symbol for, 106–107

See *also* flammable and combustible materials

methane, liquid

See compressed gases

methanol

recycling of used, 115

See *also* flammable and combustible materials

micro-organisms

hazards of cultures of, 62–63

See *also* biological hazards

microscale experiments, 52, 113

See *also* instructional strategies

microwaves

as nonionizing radiation, 80–82

microwave ovens

cautions on use for sterilization, 69

radiation hazards of, 82

in science facilities, 39

mineral acids

handling and storage of, 121

See *also* acids

mineral spirits

labelling of, 109

model rockets

hazards of use of, 77–78

mouth, use of

cautions on, 65

See *also* edible substances

MSDS

See material safety data sheets (MSDSs)

municipal bylaws

See bylaws, municipal

Municipal Directors of Disaster Services

assistance with emergency response plans, 26

museums

risk management strategies for field trips, 53

N**National Fire Protection Association (NFPA)**

about NFPA Hazchem Codes, 124–126

compressed gas storage recommendations, 92

fire extinguisher recommendations, 44

flammable substances storage recommendations, 93

natural gas

emergency response to leaks, 27–28

nature sites

risk management strategies for field trips, 53

See *also* field trips

near-miss incidents

about reports of, 32, 55

accident report form for, 55, 233–234

staff responsibilities, 8, 9

See *also* accidents and accident reports

NFPA

See National Fire Protection Association (NFPA)

nickel

precipitation for waste management, 116–117

See *also* metals

nitrates

disposal of, 17

storage of, 103–104

See *also* ammonium nitrate; oxidizing materials

nitric acid

neutralization of, 116

storage of, 100, 103–104

waste management by neutralization, 116

nitrogen, liquid

See compressed gases

nonmetal halides

about handling corrosive substances, 90

See *also* corrosive and toxic substances

Nuclear Substances and Radiation Devices Regulations, 79

O

occupant loads, maximum

fire code requirements, 12

Occupational Health and Safety Act (Alberta)

accident reports under, 31

safety requirements under, 4, 7, 13–14, 99

Web site, 243

Occupational Health and Safety Code (Alberta)

first aid kit requirements under, 40, 45

safety requirements under, 13

sound hazard exposure limits under, 78

Web sites, 55, 243

WHMIS training requirements under, 55

oil

waste management categories of, 109–110

organic acids

storage of, 100–104, 127

TDG hazard classes for, 127–128

organic substances

reactive nature of special-case organic substances, 121

owl pellets

use of, 63

oxygen

liquid oxygen (See compressed gases)

oxidizing materials

about handling corrosive substances, 90

as controlled products, 129

NFPA hazard ratings, 124–126

NFPA Hazchem special notice for, 126

reactive nature of oxidation-reduction sensitive chemicals, 121

reduction of, for waste management, 117

storage of, 99–104, 127

TDG hazard classes for, 127–128

waste management categories of, 109–110

WHMIS hazard classes, 126–128

WHMIS symbol for, 106–107

See *also* controlled products; corrosive and toxic substances

P

paint

waste management categories of, 109–110

parents

information in accident form, 234

role in science safety, 6, 10

signatures on student safety contracts, 230–231
See also students, science

pathogenic organisms
about use of cultures, 62–63
prohibition on use of human tissues and fluids, 62

personal protective equipment
about items used for, 42–43
Hazchem code for health hazards, 125
liability for use and availability of, 42 (*See also* liability, legal)
as preventative measure in MSDSs, 84, 86
in safety inspection checklist, 232
student safety contracts on, 231
use in elementary schools, 20
See also safety equipment

petroleum ether
recycling of used, 115
storage of, 103–104
See also flammable and combustible materials

physics hazards, 71–82
about hazards, 71
electrical hazards, 73–75 (*See also* electricity and electrical hazards)
heat hazards, 75–77
radiation hazards, 79–82 (*See also* radioactive materials)
rocketry hazards, 77–78
sound hazards, 78
testing structural designs, 73

pillows, spill control, 47, 94
See also spills of toxic and corrosive substances

pipettes
disposable for microscale experiments, 113
infections from, 61
use of mouth on, 65

plans for emergencies
See emergency preparedness and response plans

plants
about use of, 66–68
poisonous plants, 19, 20, 67–68

plumbing
safety standards for, 39

Poison and Drug Information Services, 29, 31

poisonous materials
about finding information on, 29, 31
about toxic effects, 87
chemical dose levels and poisons, 83
as controlled products, 129
exposure to toxic materials, 86–87
MSDS information on, 29
poisonous plants, 19, 20, 67–68
WHMIS hazard classes, 126
WHMIS symbol for, 106–107

polychlorinated biphenols
waste management categories of, 109–110

potassium hydroxide
waste management by neutralization, 116

potassium permanganate
reduction of, for waste management, 117
storage of, 103–104

precipitation of heavy metal salts
for waste management, 116–117

preserved specimens
prohibition on use of human tissues and fluids, 62
use of, 63–64, 68

pressure cooker
use in place of autoclave, 69

pressurized gases
See compressed gases

primus cartridge burners
use of, 76
See *also* burners

principals
See school administrators

professional development
See training in science safety

projectile launchers
safety measures for, 72

propane gas
emergency response to leaks, 27–28
See *also* compressed gases

protozoa
use of cultures of, 62–63

PTC paper
cautions on use of mouth, 65

pyrophors
reactive nature of, 121

R

radioactive materials
about radiation hazards, 79–82
not included in MSDSs, 106, 109
TDG hazard classes for, 127–128

reactive material, dangerously
NFPA hazard ratings, 124–126
WHMIS hazard classes for, 126
WHMIS symbol for, 106–107
See *also* controlled products

receiver of waste
See waste brokers and facilities

recycling and recovering of substances
about, 114–115

as disposal methods in chemical hazard information table, 129
information on, in chemical inventory, 104–106, 110, 235

references on science safety, 245

refrigeration

about, 39
about separation of edibles from chemicals, 99, 102
disinfectant use on refrigerator, 69
ice storage, 103
not recommended for flammable liquids, 103
not to use ice as burn treatment, 30
of fresh tissues, 64

Regulatory Approvals Centre, Alberta Environment

contact information for waste brokers, 111

resources on science safety, 245

See also Web sites

respirators

use of, 48

response plans for emergencies

See emergency preparedness and response plans

risk management, 51–59

about risks, 51–52
due diligence for, 3–5
in elementary school science programs, 19–20
in emergency response plans, 25–26
for field trips, 46
monitoring and assessment for risk reduction, 49
near-miss reports, 32
in secondary school science programs, 20–21
for use of toxic and corrosive chemicals, 90–91

rocketry hazards, 77–78

S

safety equipment

about basic equipment, 37, 40–43
in lab safety inspection checklist, 232
legislation on, 12–13
for spills of toxic and corrosive substances, 47–48
staff responsibilities for, 7–10
student responsibilities for, 10
student safety contracts on, 230–231
telephones as, 37
training on use of, 4, 55, 57
See also personal protective equipment

saliva

See human tissues and fluid specimens

salt

storage of, 103–104

salts, heavy metal

treatment for waste disposal, 116–117

sand

for chemical spills, 48

scalpels

how to use, 242

safety measures for, 72

sharps disposal, 47

School Act (Alberta)

safe and caring environment required under, 15

Web site, 243

school administrators

about roles and responsibilities of, 7–8

due diligence duties, 3–5

staff training, 4, 31

TDG and EPEA compliance by, 56–57

school boards and superintendents

about roles and responsibilities, 7

due diligence requirements for, 3–5

policies on cryogenics, 91

policies on mercury, 88

safe and caring environment required under *School Act*, 15

staff training by, 55

use of waste management brokers

(See waste brokers and facilities)

See also legislation on safety

science departments

See elementary school science programs; secondary school science programs

science laboratories

about safety in (handouts), 238–242

about general safety equipment for, 40–43

chemicals in (See chemicals and chemical hazards)

chemical hazards (See chemical hazard information table)

chemical storage (See chemical storage)

evaluation of facilities (checklist), 36–39

instructional strategies to reduce risks in, 52–53, 113–114

as OHS medium hazard site, 45

safety inspection of, 49

safety inspection of (checklist), 232

spills safety equipment, 47–48 (See also spills of toxic and corrosive substances)

student safety contracts, 21, 230–231

waste management in (See waste management and disposal; waste brokers and facilities)

See also chemical storage; safety equipment

science students

See students, science

science technicians

about roles and responsibilities of, 9–10

application of WCB to, 31

training in general safety equipment, 40–42

training in WHMIS, 15

secondary school science programs

about safety procedures for, 20–21, 229
instructional strategies, 52–53, 113–114
policies for safety procedures, 58
policies for safety procedures (sample), 238
storage systems for gr. 1–8, 101–103
storage systems for gr. 9–12, 101, 103–104
student safety contracts, 21, 231
See *also* science laboratories; waste management and disposal

Sewer Service Bylaw (Calgary), 243**Sewer Use Bylaw (Edmonton), 243****sewers**

See landfills and sewers

sharps disposal, 47**shelf life of chemicals, 98, 111****shock and fainting**

emergency response to, 30 (See *also* medical emergencies and treatments)

short circuits

fire hazard from, 74

See *also* electricity and electrical hazards

showers in science labs

about emergency use of, 41
safety requirements for, 36, 39, 232

sight and seeing

See eyes, care of

silicon carbide

use as boiling chips, 240

skin, care of

about personal protective equipment for, 42–43
about treatment of injuries to, 28–29
NFPA hazard code for avoiding skin contact, 125
TDG hazard classes for corrosives that destroy skin, 128
ultraviolet radiation hazards for skin, 81
See *also* gloves; medical emergencies and treatments; personal protective equipment

smoking, cigarette

prohibition in OHS Code, 14

sodium carbonate

waste management by neutralization, 116

sodium chlorate

reduction of, for waste management, 117

sodium hydroxide

separate storage of solid and liquid forms, 102, 103–104
waste management by neutralization, 116

sodium hypochlorite solutions

use for cleaning scalpels, 242

sodium periodate

reduction of, for waste management, 117

sodium persulfate

waste management by neutralization, 116

solids

flammable solids, 102, 127–128 (*See also* flammable and combustible materials)

spill management of, 95 (*See also* spills of toxic and corrosive substances)

storage classes, 126–127

storage of, 103–104

waste disposal in landfills (*See* landfills and sewers)

waste inventory of, 109–110

solutions

See liquids and solutions

solvents

recycling of organic solvents, 115

spill management of, 47–48, 94 (*See also* spills of toxic and corrosive substances)

sound hazards

ear damage from, 78

spark timers

use of, 74

special needs students

See students, special needs

specimens, biological

collection and use of, 62–64, 68

See also biological hazards

spills of non-toxic substances

See housekeeping

spills of toxic and corrosive substances

about management of, 93–95

about safety equipment for, 47–48

containers for waste management, 47

in emergency response plans, 24, 27, 93

micro-organism cultures, 63

special policies on mercury, 88, 110

spill control pillows, 47, 94

spill kits for, 47–48

training in clean-up, 55

See also emergency preparedness and response plans *and* *specific substances*

spirometers

use of mouth on, 65

squeeze bottles in eyewash stations, 37, 41

See also eyes, care of

starch

storage of, 103–104

sterilization

autoclave maintenance and cleaning, 69

how to use an autoclave, 242

of culture mediums, 63

use of pressure cooker for, 69
use of sterilizing cabinet for, 42, 69

stoppers

how to remove from glass tubing or thermometers, 240

stroboscopes

use of, 82

structural design tests

use of, 73

students, science

about roles and responsibilities, 10, 57–59
about rules and procedures for (handout), 229
about student safety contracts, 230–231
student medical information, 19, 20, 31, 66, 68, 231
student medical information on allergies and allergens, 9, 10
training in science safety, 57–59, 75
See also medical emergencies and treatments; parents;
students, special needs

students, education

roles and responsibilities, 6

students, special needs

about support systems for, 7, 8, 9
doorway widths in science facilities, 37
emergency response plans for, 23

students, work experience

application of OHS to, 13
application of WCB to, 31
WHMIS requirements for, 54

sulfides

chemical treatment for waste management, 118

sulfuric acid

waste management by neutralization, 116

sunglasses, UV filtering

use of, 43, 81
See also eyes, care of

supplier labels, 107–108

See also labels

syringes

use of, 66

T

table, chemical hazard information

See chemical hazard information table

TDG

See Transportation of Dangerous Goods

teachers, science

about roles and responsibilities of, 8–9, 18–20, 238
about safety procedures and policies, 56–58
duty of due diligence, 3–5
duty to refuse unsafe work, 53
instructional strategies, 52–53, 113–114

- occupational legislation on, 13–15
- risk management by, 51–52
- safety policies and procedures (handout), 238
- teachers, substitute**
 - duty to refuse unsafe work, 53
 - science department policies and procedures for, 238
- Teachers Code of Conduct, ATA**
 - staff competency requirements, 4
- Teaching Profession Act (Alberta)**
 - teacher conduct requirements under, 15–16
 - Web site, 243
- teaching strategies**
 - for reduction of risks, 52–53, 113–114
 - See also safety equipment
- technicians, science**
 - See science technicians
- telephones**
 - as safety equipment, 37
- tesla coils**
 - use of, 74–75
- test tubes**
 - how to shake, 242
 - use of test tube holders, 75
- thermometers**
 - cautions on use of mouth on, 65
 - how remove from stoppers, 240
 - mercury hazards, 88
- tobacco**
 - exclusion from WHMIS requirements, 106
 - smoking prohibition in OHS Code, 14
- tongs**
 - use of, 43, 75
- tools**
 - use of, 71–72
- toxic plants, 19, 20, 66–68**
- toxic substances**
 - See corrosive and toxic substances; poisonous materials;
 - spills of toxic and corrosive substances
- training in science safety**
 - about roles of teachers, 8–9
 - about topics for, 55
 - due diligence requirements, 3–5
 - in emergency medical treatments, 28–31
 - in emergency response plans, 24, 26
 - in first aid, 28, 45, 46, 55
 - records on, inspection of, 13, 56, 232
 - roles of school board and school administrators, 7, 54–55
 - student safety contracts, 230–231
 - student training, 57–59, 75
 - TDG training, 7–8, 17, 56, 99
 - WHMIS training, 7, 15, 54–55, 83

transportation

for field trips, 53

Transportation of Dangerous Goods Act (Alberta), 16–17, 127, 243

Transportation of Dangerous Goods (TDG) regulation

about requirements under, 16–17, 56

data on, in chemical inventory, 104, 235

hazard classes and divisions under, 127–128

labels for substances under, 109

receiving orders of chemicals, 99

role of science teachers and technicians, 8, 9

training on, 7–8, 17, 55–56, 99

waste materials transported under, 111

Web site for Act, 243

turpentine

labelling of hazards of, 109

U**ultraviolet rays**

as radiation hazard, 80–82

use of UV filtering sunglasses, 43, 81

use of UV sterilizing cabinets, 42, 69

unknown chemicals

transportation of, 111

use of lab stations to avoid, 114

waste management categories of, 109–110

urine specimens

prohibition on use of human fluids, 62

V**Van De Graaff generators**

how to avoid a discharge from, 241

use of, 74–75

ventilation

exhaust systems for, 38, 39, 42

vermiculite

for chemical spills, 47

video presentations

use of, 52

See also instructional strategies

vinegar

storage of, 103–104

viruses

prohibition on use of human tissues and fluids, 62

safety procedures for cultures, 62–63

See also biological hazards

vision care

See eyes, care of

volunteers

role in science safety, 10

W

waste management and disposal

about wastes, 109–112

biohazard disposal, 48

information on, in chemical hazard information table, 129

information on, in chemical inventory, 104–106, 235

instructional strategies to reduce

(See instructional strategies)

inventory of waste, 109–110

legislation on, 16, 17, 56–57, 111–112, 243

recycling and recovery, 114–115

(See *also* recycling and recovering of substances)

separation of wastes, 112

sharps disposal, 47

shelf life of chemicals, 98, 111

staff roles and responsibilities for, 7–10

staff training in, 7, 55

storage of wastes, 109–110

TDG hazard classes and divisions, 127–128

treatment of wastes before disposal, 115–118

See *also* landfills and sewers; waste brokers and facilities;
and specific waste materials

waste brokers and facilities

about, 111–112, 115

chemical waste brokers in Alberta (list), 236–237

waste generator identification numbers, 112

Waste Control Regulation (Alberta)

requirements under, 16, 111

Web site, 243

waste generator identification numbers, 112

water

NFPA hazard ratings for water reactive, 124–126

reactive nature of water sensitive chemicals, 121

shock hazard from electrical equipment near, 73

See *also* liquids and solutions

Web sites

on acts, regulations, codes and bylaws, 243

on carcinogens (list), 89

on emergency response plans, 26

on model rockets, 77–78

on MSDS information, 84

on NFPA rating systems, 126

on OHS requirements for first aid kits, 45

on radiation hazards, 79

on toxic and nontoxic plants, 68

on WHMIS training, 15, 55

on Work Safe Alberta, 15, 55
references on science safety, 245

welders

as source of nonionizing radiation, 81

WHMIS

See Workplace Hazardous Materials information System

Work Safe Alberta Web site

agents for WHMIS training, 15, 55

Workers' Compensation Act

requirements of, 31–32

Workplace Hazardous Materials Information System (WHMIS)

about WHMIS system for controlled products, 15, 18, 54–55

about material safety data sheets (MSDSs), 15, 84–86

application to staff and students, 54

for chemical inventory, 105–106, 235

disposal of chemicals without WHMIS info, 111

labels for materials, 106–109

labels for recovered substances, 114

labels for waste, 109

symbols, 106–107

training agents for, 15

training in, 7, 15, 54–55, 83

Web site for information on MSDSs, 84

See *also* controlled products; labels

workplace labels, 108

See *also* labels

X

X-rays, 80

Z

zinc

precipitation for waste management, 116–117

See *also* metals

zoos

field trips to, 53

See *also* field trips