



**LAB113**

# Chemical Laboratory Waste Management

## Course Introduction:

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The primary goal in handling and disposal of hazardous waste is to do so in a manner which prevents harm to human health and the environment. Extensive federal, state, and local regulations govern hazardous waste management. The University is covered by these regulations, which are beyond the scope of this guide but, in general, they regulate the handling, transportation, storage, and disposal of waste. The regulations also require extensive record keeping and a "cradle to grave" tracking system which tracks hazardous wastes from their point of generation through disposal. This allows all waste to be accounted for at any stage between generation and disposal.

## Course Objectives:

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The course is designed to explain the fundamentals of the role of the chemical engineer in the basics of chemical engineering systems for design and production element required in their daily work. It also includes the concepts for construction of chemical products in a safe environment and under construction controls.

The course will also highlight the role involved in basic project work as a team and as an individual.

## Who Should Attend?

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This course is intended for all potential chemical engineers and technicians with some experience and basic understanding of chemical engineering and those involved with basic chemical engineering, efficiency to a safe and competent standard as well as those with no prior knowledge of chemical engineering and are not normally involved with chemical products.

## Course Fees:

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**To be advised as per the course location.** This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

## Course Methodology:

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**A variety of methodologies will be used during the course that includes:**

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play

- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

## Course Certificate:

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**International Center for Training & Development (ICTD)** will award an internationally recognized certificate(s) for each delegate on completion of training.

## Course Outline:

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### Day 1:

#### PRE TEST

#### General Safety

- **General Safety & Operation Rules**
  - General rules of safety
  - Personal hygiene
  - Housekeeping
  - Electrical
  - Vacuum Operations
  - Handling glassware
- **General Safety Equipment**
  - Fire extinguishers
  - Safety Showers
  - Eyewash fountains
  - First aid kits
  - Explosion-proof refrigerators
  - Ventilation hoods
  - Flammable liquid storage cabinets
  - Safety shields
- **Personal Protective Equipment**
  - Eye protection
  - Clothing

- Aprons - rubber or plastic
- Gloves
- Respirators
- **Compressed Gas Safety**
  - Gas cylinder identification
  - Gas cylinder handling & use
  - Gas cylinder transportation
  - Cryogenic liquids
- **Safety Practices for Disposal of Broken Glassware**
- **Centrifuge Safety**

## Day 2:

### Emergency Response

- **Chemical Spills**
  - Emergency chemical spills
  - Minor chemical spills
  - Mercury spills & cleanup procedures
- **Radiation Spills**
  - Minor spills
  - Major spills
  - Accidents involving rad. dusts & vapors
  - Injuries involving radioactive hazards
- **Biohazard Spills**
  - Biological spills
  - Blood spills
  - Cytotoxic/Antineoplastic spills
- **Leaking Compressed Gas Cylinders**
- **Fires**
- **Medical Emergencies**
  - General first aid
  - Personal protection during 1st aid
- **Accident Reporting**

### Quiz in General Safety & Emergency Response

- **Individual Quiz**
- **General Discussion**
- **Case Study**

## Day 3:

### Chemical Hygiene Plan

- **Laboratory Chemical Safety Policy**
  - Introduction
  - Scope & definitions
  - Organization's responsibilities
  - Individual responsibilities
  - Content of chemical hygiene plan
  - Exposure assessments, medical consultations, examinations
- **Records & recordkeeping**
- **Hazardous Chemical Waste Disposal Policy**
- **Chemical Safety**
  - Modes of chemical entry
  - Basic chemical classifications
  - Incompatible chemicals
  - Chemical stability
  - Shock-sensitive chemicals
  - Material Safety data sheets
  - Procurement of chemicals
  - Spill prevention
  - Handling & transportation of chemicals
  - Chemical storage
  - Prior approval
- **Chemical Waste**
  - Basic procedures
  - Containers
  - Container condition
  - Container volumes & sizes
  - Labeling of containers
  - Disposal of empty containers
  - P-waste list
  - Storage of waste chemicals
  - Bulking or mixing of waste chemicals
  - Overpacking or boxing up of multiple chemical containers
  - Chemical surplus removal request form
  - Hazard identification
  - Hazardous materials surplus program

### Radiological Safety Concepts

- Radiological Safety

- Organization & purpose
- Functions of Radiological Safety Committee
- Radiological Safety Officer (RSO)
- Radioisotope Procurement Agent (RPA)

### **Regulations Concerning Procurement & Usage of Radioisotopes, Equipment & Services**

- Unsealed radioisotopes
- Sealed radioisotopes
- Sources of ionizing radiation produced by difference in potential
- Irradiation service

### **Specific Radiological Safety Standards**

- References
- Maximum permissible levels from external sources in restricted areas
- Radiation areas
- Protective clothing
- Contamination Control
- Eating & smoking
- Package receipt procedures
- Storage, transporting & handling of radioactive materials
- Waste disposal (10 CFR 20.301)
- Personnel monitoring
  - Survey instruments--access & calibration
  - Responsibility for training in Health
  - Physics

### **Quiz in Chemical Hygiene Plan & Safety Concepts**

- **Individual Quiz**
- **General Discussion**
- **Case Study**

### **Day 4:**

#### **Laser Safety**

- **Policy and Scope**
- **Administration**
  - Evaluation Procedures
  - Audits & Inspection
- **Laser Hazards and Hazards Evaluation**
  - Introduction
  - Eye & skin hazards
  - Electrical, fire and other hazards
  - Hazard evaluation

- Applicable standards
- **Laser Classifications**
  - Applicable standards
- **Safety and Control Measures**
  - Engineering
  - Administrative & procedural measures
  - Special measures for medical applications
  - Other special control measures
  - Applicable standards
- **Accident Reporting**
  - Medical surveillance
- **Laser Safety Plan**
  - (Specifications needed to acquire a laser system)

### **Administrative Concerns**

- **Training**
  - Hazard communication
  - First aid & CPR
  - Bloodborne pathogens
  - Fire extinguishers
  - Spill response training
  - Respiratory protection training
- **Safety Audits**
  - Safety Surveys
- **Facility Design**
  - Lighting
  - Emergency lighting
  - Floors-stairways-aisles
  - Egress
  - Electrical
  - Ventilation, indoor air quality, heating & cooling
  - Ventilation hoods
  - Chemical storage
  - Biohazard facility design
  - Safety showers & eyewash fountains
  - Sinks
  - Sanitation facilities, lunch & break areas
  - Telephones
  - Fire protection
  - Operations

- **Facility Testing & Maintenance**

- Chemical fume hoods
- Electrical equipment
- Eyewash fountains
- Fire protection equipment
- First aid kits
- Safety showers

### **Quiz in Laser Safety & Administrative Concerns**

- **Individual Quiz**
- **General Discussion**
- **Case Study**

### **Day 5:**

#### **Standard & Special Operating Procedures**

- Standard Operating Procedures
- Special Procedures
- Respiratory Protection Program
- Substance-Specific Safety Procedures

#### **Facility Data**

- Facility Description
- Chemical Inventory List (CIL)
- Material Safety Data Sheets (MSDSs)
- Air Monitoring Data

#### **Unit Operations**

- Policy and standards
- The concept of Unit Operations.
- Examples of Unit Operations (Distillation, Adsorption, Drying, Extraction, Evaporation, etc).
- Basic flow diagrams of Unit Operations.

#### **General Discussion of the Following Aspects**

- Potential peroxide forming chemicals
- Incompatible chemicals
- Potential shock sensitive chemicals
- Neutralization of spent acids and bases
- Cleaning solution for laboratory glassware
- Decontamination and destruction of ethidium bromide
- Health and safety meetings

- Departmental and college waste codes
- Safety survey list
- Quantities of radioisotopes packages exempt from special handling and monitoring
- Example chemical surplus removal request forms
- Cytotoxic/antineoplastic drugs
- Cytotoxic/antineoplastic agents
- Laboratory environmental audit

#### Quiz in Standard and Special Operating Procedures & Facility Data

- Individual Quiz
- General Discussion
- Case Study

POST TEST

## Course Requirement:

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"**Hand's on practical sessions, equipment and software** will be applied during the course if required and as per the client's request".

## Course Timings:

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#### Daily Course Timings:

|               |                            |
|---------------|----------------------------|
| 08:00 - 08:20 | Morning Coffee / Tea       |
| 08:20 - 10:00 | First Session              |
| 10:00 - 10:20 | Coffee / Tea / Snacks      |
| 10:20 - 12:20 | Second Session             |
| 12:20 - 13:30 | Lunch Break & Prayer Break |
| 13:30 - 15:00 | Last Session               |