

Chemical Calculations and Laboratory Operations Training Course

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Overview

Chemical Calculations and Laboratory Operations Training Course is a one-week foundation course for laboratory technicians, junior chemists, quality-control assistants and process laboratory personnel who leave with a Laboratory Calculation and Operations Workbook. Participants apply units, significant figures, concentration, dilution, stoichiometry, solution preparation, sampling, basic statistics, equipment checks, records, waste handling and chemical hygiene. Agile Leaders Training Center develops practical chemical laboratory capability.

Who Should Attend

- Laboratory teams responsible for routine preparation and testing support
- Quality-control teams responsible for calculations and record review
- Process laboratories responsible for samples, reagents and results
- Technical staff responsible for balances, glassware and basic equipment checks
- New laboratory personnel building controlled-work habits

The course assumes basic arithmetic and chemical terminology and leaves out technique-specific instrument methods and advanced uncertainty modeling.

Departments and Industries

The course supports routine laboratory work across testing and process sectors.

- Chemical, petrochemical and refining laboratories
- Water, environmental and utility testing
- Food, pharmaceutical and consumer-product quality control
- Mining, metals and materials testing
- Research support and technical services

Learning Objectives

By the end of this course, participants will be able to:

- Apply units, significant figures and conversion factors
- Build concentration, dilution and stoichiometric calculations
- Use controlled solution and standard preparation records
- Analyze replicate and control data
- Diagnose calculation and preparation errors

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- Evaluate laboratory records and safe-work controls

Course Agenda

Day 1: Units and Calculation Control

- SI Unit, Prefix and Dimensional-Analysis Method
- Significant-Figure and Rounding Decision Rules
- Mass, Volume, Density and Temperature Conversion Sheet
- Calculation Check, Independent Review and Error Log
- Laboratory Calculation and Operations Workbook Structure

Day 2: Concentration and Solution Preparation

- Molarity, Mass Concentration and Percent Expression Map
- Dilution Equation and Serial-Dilution Plan
- Stoichiometric Reaction and Reagent-Quantity Worksheet
- Stock, Intermediate and Working Standard Preparation Record
- Volumetric Glassware Selection and Meniscus Checklist

Day 3: Samples, Measurements and Equipment

- Sampling Plan, Label and Chain-of-Custody Record
- Balance Verification and Weighing Technique Checklist
- Pipette, Burette and Volumetric-Flask Use Controls
- Temperature, pH and Conductivity Check Record
- Reagent Receipt, Storage and Expiry Register

Day 4: Data, Quality and Safe Operations

- Mean, Range, Standard Deviation and Relative-Error Sheet
- Blank, Duplicate, Spike and Control-Sample Review
- Traceability, Method Record and Result-Release Checklist
- Chemical Hygiene, SDS and Exposure-Control Matrix
- Waste Segregation, Labeling and Disposal Record

Day 5: Laboratory Practice and Capstone

- Exercise: Verify Units and Correct Calculation Errors
- Exercise: Prepare a Dilution and Standard Sequence
- Exercise: Review Replicate and Control-Sample Data
- Exercise: Diagnose a Preparation and Record Deviation
- Capstone Exercise: Complete a Laboratory Calculation and Operations Workbook

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Practical Exercises

The course uses suggested activities that connect calculations with controlled laboratory practice.

- Suggested activity: convert units and verify significant figures in test calculations
- Suggested activity: prepare stock and working-solution records from a stated requirement
- Suggested activity: review balance, glassware and control-sample evidence
- Suggested activity: assemble calculation, safety and waste records for a routine task

FAQs

Who suits the Chemical Calculations and Laboratory Operations Training Course?

Laboratory technicians, junior chemists, quality assistants and process laboratory personnel suit the course when they have basic arithmetic and chemical terminology.

How does chemical calculations training differ from analytical instrument training?

Chemical calculations training develops transferable preparation, measurement, data and record practices, while instrument training focuses on one measurement technology.

Which concentration calculations are used in laboratory operations?

Laboratory operations use molarity, mass concentration, percent expressions, dilution factors, serial dilutions and stoichiometric quantities according to the stated method.

How are laboratory calculation errors controlled?

Calculation errors are controlled through clear units, recorded formulas, significant-figure rules, plausibility checks, independent review and correction records.

What laboratory quality records are practiced?

Participants practice solution records, equipment checks, sample labels, chain of custody, control-data review, deviation records and result-release checks.

Conclusion

Participants complete a Laboratory Calculation and Operations Workbook that links calculations, preparation, equipment checks, data review and safe-work records. The workbook improves repeatability and review of routine laboratory tasks. Its templates support controlled work across chemical, environmental, process and product-testing laboratories.

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