

Chapter 1 - Introduction to CHEMCAD

Overview of CHEMCAD and Its Uses

CHEMCAD Products and Features

- ✓ CC-STEADY STATE
- ✓ CC-DYNAMICS
- ✓ CC-BATCH
- ✓ CC-THERM
- ✓ CC-SAFETY NET
- ✓ CC-FLASH

CHEMCAD Features by Module

UnitOps by Module

Chapter 2 - Getting Started with CHEMCAD

Installing the Software

Licensing CHEMCAD

- ✓ Types of CHEMCAD Licenses
- ✓ License Settings
- ✓ Updating a License

Getting Help with CHEMCAD

- ✓ Online Help
- ✓ CHEMCAD Coach
- ✓ Procedure Demos
- ✓ The Chemstations Web Site
- ✓ Contacting Chemstations Technical Support

Chapter 3 - The CHEMCAD Interface

The CHEMCAD Window

- ✓ The Workspace
- ✓ The CHEMCAD Explorer Pane
 - The Recent Files Tab
 - The Simulation Tab
 - The Visual Basic Tab
- ✓ The Palette Pane
 - Selecting a Palette
 - Customizing Palettes
- ✓ The Messages Pane
 - The Errors and Warnings Tab
 - The Run Trace Tab
 - The Notes Tab
- ✓ The Main Menu
- ✓ The Toolbar

Customizing the CHEMCAD Screen

- ✓ Viewing and Hiding Screen Elements
- ✓ Resizing and Moving Items
 - Resizing a Pane
 - Moving a Pane

- ✓ Pinning and Unpinning Panes

Other Useful Interface Hints

- ✓ Undo and Redo
- ✓ Visible Grid
- ✓ Adjusting Your View of the Workspace
- ✓ The CHEMCAD Coach Pane

Chapter 4 - Working with Simulation Files

About CHEMCAD Simulation Files

- ✓ User Components in CHEMCAD
- ✓ Example Files

Opening an Existing Simulation

Creating a New Simulation

Saving a Simulation

- ✓ Saving Different Cases for the Same Simulation

E-mailing a Simulation

Working with CHEMCAD Files from Previous Versions

Chapter 5 - Building and Using a Basic Simulation

Starting a New Simulation

Selecting Engineering Units

Drawing the Flow sheet

- ✓ Adding UnitOps
- ✓ Selecting a Default Icon for a UnitOp
- ✓ Manipulating UnitOp Icons
- ✓ Drawing and Connecting a Stream
 - Choosing a Stream Route .
 - Rerouting a Stream

Other Drawing Tools

- ✓ The Text Tool
- ✓ Simple Drawing Tools: Rectangle, Ellipse, and Line
- ✓ Complex Drawing Tools: Multi-line and Polygon

Selecting Chemical Components

- ✓ Finding a Component
- ✓ Adding a Component
- ✓ Changing the Order of Selected Components
- ✓ Removing Items from the Selected Components List

Selecting K-value and Enthalpy Options

- ✓ Using the Thermodynamics Wizard
 - Selecting Components to Ignore
 - Specifying Process Conditions
 - How the Thermodynamics Wizard Makes Suggestions
 - Should the Thermodynamics Wizard be trusted to make design decisions?
- ✓ Manually Selecting Thermodynamics Settings

Defining Streams

- ✓ Thermodynamic Properties
- ✓ Stream Composition

- ✓ Total Flow Properties

Specifying Equipment Parameters

Running the Simulation

Reviewing the Results

Chapter 6 - Using CHEMCAD for High-fidelity Modeling

What is high-fidelity modeling

Criteria for High-fidelity Modeling

Introduction to Equipment Sizing

High-fidelity Modeling and Sizing for Common UnitOps

- ✓ Piping
 - Low-fidelity
 - Sizing
 - High-fidelity
- ✓ Pumps, Compressors, and Expanders
 - Low-fidelity
 - High-fidelity
- ✓ Vessels and Tanks
 - Low-fidelity
 - Sizing
 - High-fidelity
- ✓ Valves
 - Low-fidelity
 - Sizing
 - High-fidelity
- ✓ Columns
 - Low-fidelity
 - Sizing
 - High-fidelity
- ✓ Heat Exchangers
 - Low-fidelity
 - Sizing
 - High-fidelity
- ✓ Relief Devices
 - Low-fidelity
 - High-fidelity

Licensing Considerations for High-fidelity Modeling

- ✓ License Settings

Chapter 7 - Building and Using a Dynamic Simulation

What do we mean by dynamics?

Licensing Considerations

- ✓ License Settings

Additional Input for Dynamic Operation

- ✓ Strategies for Dynamic Simulations

Setting Up Dynamic Operation

- ✓ Switching to Dynamics
- ✓ Setting the Run Time

- ✓ Selecting Streams and UnitOps

Running a Dynamic Simulation

- ✓ Run from Initial State
- ✓ Run from Current State
- ✓ Run One Step at a Time

Other Dynamic Commands

- ✓ Reset to Initial State
- ✓ Save As Initial State

Output from Dynamic Simulations

- ✓ Reviewing the Flowsheet Specifications
- ✓ Plotting Dynamic Results
- ✓ Text-based Dynamic Reports

Chapter 8 - Output and Reports

Text Reports

- ✓ Report Setup
- ✓ Stream-based Reports
 - Stream Groups
 - Stream Compositions
 - Stream Properties
 - Particle Size Distribution
 - Pseudo component Curves

UnitOp-based Reports

- ✓ UnitOp Groups
- ✓ Select UnitOps
- ✓ Spec Sheet
- ✓ Distillation

Flow sheet-based Reports

- ✓ Topology
- ✓ Thermodynamics
- ✓ Mass and Energy Balances

Dynamics Reports

- ✓ Batch Results
- ✓ Dynamics

Consolidated Report

Graphical Reports

- ✓ Thermo physical Data Graphs
 - TPXY
 - Binary LLE
 - Binodal Plot
 - Binodal/Residue Curves
 - Residue Curves
- ✓ Flow sheet-based Graphs
- ✓ UnitOp-based Plots
 - Tower Profiles
 - Heat Curves
 - Plug Flow Reactor Profile
 - Pipe Profile
 - Controller Convergence

- ✓ Dynamic Plots
- ✓ User-specified File

Printing CHEMCAD Reports

Process Flow Diagrams

- ✓ Flow sheet Data boxes
 - Stream Boxes
 - UnitOp Boxes
 - TP Boxes
 - Excel Range Boxes
- ✓ Using the Layers Feature for Selective Viewing and Printing
 - Scenarios for Using Layers
 - Creating a New layer
 - Assigning Objects to a Layer
 - Hiding and Viewing Layers
 - Removing an Object from a Layer
 - Deleting an Entire Layer
- ✓ Printing a Process Flow Diagram

Chapter 9 - Customizing CHEMCAD

Flow sheet Templates

- ✓ Creating a Template
- ✓ Viewing a Template' s Properties
- ✓ Applying a Template
- ✓ Renaming or Deleting a Template

Creating Custom Components

- ✓ Adding a Single Component
 - Creating the Component
 - Regressing Data into the Component
- ✓ Pseudo component Range
- ✓ Importing a Neutral File

Creating a Custom Symbol

Customized Costing Calculations

Creating Custom UnitOps

- ✓ Creating a Custom UnitOp Dialog Box

Customizing Thermodynamics

- ✓ Creating a Custom K-value or Enthalpy Model
- ✓ Creating a Custom Mixing Rule

Visual Basic Applications (VBA)

- ✓ Defining a Reaction, Mixing Rule, or UnitOp
- ✓ Using a VBA-defined Reaction
- ✓ Using a VBA-defined Mixing Rule
- ✓ Using a VBA-defined UnitOp

Chapter 10 - Data Interfaces

Excel Data Mapping

- ✓ Creating an Excel Data Map
- ✓ Data Map Execution Rules

Creating Excel UnitOps

Specification Sheets

Using CHEMCAD as an OPC Server

- ✓ OPC Applications
- ✓ OPC Compliance
- ✓ Enabling CHEMCAD as an OPC Server
- ✓ Reading and Writing Values to CHEMCAD Using OPC
- ✓ OPC Server Operations
- ✓ CHEMCAD OPC Namespace

COM Interfaces

- ✓ Connecting Excel and CHEMCAD: A Simple COM Interface
 - Using the VBClient Example
 - A Peek under the Hood

Chapter 11 - Detailing of CHEMCAD products

CC-STEADY STATE

Overview

Starting a New Simulation

Selecting Engineering Units

Drawing the Flow sheet

- ✓ Placing UnitOps
- ✓ Drawing Streams

Selecting Components

Selecting Thermodynamic Options

Defining the Feed Streams

Enter UnitOp Parameters

- ✓ First Heat Exchanger
- ✓ Second Heat Exchanger
- ✓ Flash Drum
- ✓ Valve
- ✓ Stabilizer Tower

Run the Simulation

Review the Results and Print as Needed

- ✓ Checking the Cricondenthem Dewpoint
- ✓ Checking the Bottoms Stream Purity
- ✓ Re-running the Simulation
- ✓ Producing a Text Report
- ✓ Generating a Process Flow Diagram

CC-THERM

Overview of the Heat Exchanger Sizing Process

Identify the Tube-side Stream

Generate the Heat Curve

Define General Specifications

Set Tube Specifications

Set Shell Specifications

Set Baffle Specifications

- ✓ Baffle Spacing
- ✓ Baffle Cut Percent
- Set Nozzle Specifications
- Set Clearance Specifications
- Set Material Specifications
- Set Miscellaneous Specifications
- Run Sizing Calculations
- Review Results and Create Plots

CC-BATCH

- Description of the Problem
- Overview of the Batch Distillation Process
- Creating a New Simulation
- Selecting Engineering Units
- Drawing the Flow sheet
 - ✓ Placing UnitOps
 - ✓ Drawing Streams
- Selecting Components
- Selecting Thermodynamic Options
- Specifying Pot Charge
- Specifying the Distillation Column
- Defining the Operating Steps
 - ✓ Operating Step 1
 - ✓ Operating Step 2
 - ✓ Operating Step 3
 - ✓ Operating Step 4
 - ✓ Operating Step 5
- The Run Time Information Dialog Box
- Running the Simulation
- Reviewing and Printing Results
 - ✓ Plotting the Results
 - ✓ Generating Text Reports
 - ✓ Generating a Full Report

Piping

- Control Valve Sizing Example
 - ✓ Problem Statement
 - ✓ Rating Case
 - ✓ Flow Rate as a Function of Pressure
- Simple Flow Example
 - ✓ Problem Statement
 - ✓ Creating the Simulation
 - ✓ Using Controllers to Simplify the Problem
 - ✓ Calculating NPSHA
- Branched Flow Example
 - ✓ Problem Statement
 - ✓ Creating the Simulation
 - ✓ Running the Simulation
 - ✓ Selecting a Pump