



A Chemist's Guide to Chemical Engineering



A 3½ day course given by
Dr Keith Turner
Kappa Tau Consulting



18 - 21 October 2011
The Radisson Blu Hotel
Edinburgh, Scotland

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General Information

The course will begin with registration from 8.30am on Tuesday 18 October and ends at with lunch on Friday 21 October.

The organisers reserve the right to change the published programme of events and course content as circumstances dictate.

Fee

£1295.00 (+ VAT @ 20%) including lunch & refreshments, the course dinner on Tuesday 18 October and comprehensive course manual.

Introduction

R&D chemists are often at a disadvantage when working in process research and development because of their lack of knowledge about the basic principles of chemical engineering. Most chemical engineering courses aimed at chemists are actually developed and presented by chemical engineers. As a result they tend to be mathematically based and unsuitable or uninteresting for R&D chemists.

This course is different; it has been developed and is presented by a chemist, for chemists. It does not dwell on the derivation of a mathematical formula or equations. Instead, it focuses on what chemists need to know about the information and data that engineers require for design and scale-up.

Chemical engineering without mathematics is impossible and so this course does contain mathematics, but at a level that should not trouble degree-level chemists. Chemists do not need to know how to design plants or equipment and, since most chemists are not interested, this course does not attempt to teach them. A chemist does need to know what information is needed for design, scale-up and commercial plant operation and how the experimental data and information are used.

Course Outline

Section 1 – Introduction

What is Chemical Engineering?
Dimensionless Numbers, what are they and what do they mean?
Mass Balances
Energy Balances
Process Flow Diagrams

Section 2 - Fluids and Fluid Flow

Introduction to Fluid Flow
Reynolds Number
Friction in Pipes & Bernoulli's Equation
Pumping Fluids & Pump Types
The Importance of Mixing
Mixing and Blending Operations
Types of Mixers and Agitators
Effect of Mixing on Reactions and Products

Section 3 - Heat Transfer

Introduction to Heat Transfer
Heat Transfer Coefficients
Heat Exchangers
Introduction to Drying
Analysing Drier Performance
Psychrometric Charts

Section 4 – Mass Transfer & Separation

Introduction to Mass Transfer
Mass Transfer Coefficients
Introduction to Separation Processes
Introduction to Column Separations
Vapour Pressure and VLE Data
Distillation Methods & Techniques
Information Required for Column Design

Section 5 – Solid/Liquid Separations

Introduction to Solid Liquid Separations
Selecting SLS Equipment
Laboratory Testing Methods for SLS Scale-Up
Filters and Filtration
Centrifugation and Centrifuges
Evaluating Centrifuge Performance

Section 6 – Extraction Processes

Introduction to Extraction Processes
Solvent Extraction
Mass Balance in Extraction
Using and Understanding Phase Diagrams
Selecting Extraction Equipment

Section 7 – Reactors

Types of Reactors
Basis of Reactor Design
Scale up of Reactors
Batch Reactor Performance and Modelling

“Excellent course.”
GSK

Tutor



Dr Keith Turner

Keith Turner received his BSc in Chemistry from London University in 1971 after a four year sandwich course with BP, during which time he spent industrial training periods at Sunbury Research Centre, Baglan Bay Chemical Factory and Belfast Oil Refinery.

He was awarded a DPhil by Sussex University in 1974 for research work into Organometallic chemistry with Professor M.F. Lappert. He then worked for three years with Rohm & Haas UK Ltd. in Tyneside as a process development chemist on acrylic and methacrylic monomers and polymerisation chemistry.

In 1978 he moved to Davy Powergas process research and development group on Teesside (now Davy Process Technology) where he worked on the development of catalytic processes for the organic and petrochemical industries. As well as laboratory investigations, he also participated and led teams involved in the marketing and commercialisation of technologies including licensing evaluations. He finally became Business Development Co-ordinator where he co-ordinated R&D and commercial activities between Davy and its various collaborators.

In 1991 he joined US based Catalyst Consultants at its UK office in East Sussex as a project manager and left to set up his own consultancy practice in November 1992. He undertakes consultancy work in the field of chemical process development and biodiesel production and also develops and offers training for personnel in these industries. keith@kappa-tau.co.uk

Venue



The Radisson Blu Hotel
80 High Street, The Royal Mile
Edinburgh EH1 1TH
Scotland
Tel: +44 131 557 9797 www.radissonblu.co.uk/hotel-edinburgh

The Radisson Blu Hotel is located halfway between Edinburgh Castle and Holyrood Palace and within a few minutes walk from the designer shops on Princes Street. Waverley Station is only a 5 minute walk away.

A limited number of rooms have been reserved at the hotel for the special rate of £115 per night including VAT and a full Scottish breakfast. A hotel booking form will be sent when you register.

Who Should Attend?

Chemists who are working, or have recently begun work, on process R&D, pilot plants or production plants.

Course Objectives

Chemists and engineers regularly interact and collaborate in process R&D, and they should each understand the needs and objectives of the other discipline. This course gives chemists an introduction to the main topics in chemical engineering that will help them realise the importance of the subject. It introduces and describes the principles of chemical engineering without resorting to the excessive use of mathematics. The course will help chemists appreciate the role of engineers and assist in understanding their requirements. It will attempt to answer the questions of what data and information are needed, why are they needed and how chemists can provide them.

The course will allow chemists to improve and understand the vital interaction between chemistry and chemical engineering. It will also provide knowledge that can improve both the chemist's own work in process R&D as well as their own job function and career prospects.

Course Manual

Participants will receive a comprehensive course manual containing copies of all the slides presented.

Workshops, Problems and Case Studies

The course will include some basic problems and case studies on an individual and group basis. These will include evaluation of mass and energy balances, estimating pumping requirements and fluid flow, some basic process design concepts and calculation of heating and cooling requirements.

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