

Configu
Glass-Lin

Temperature
Sensor
Terminal
Block

Top View

THE PILOT PLANT REAL BOOK

**A Unique Handbook for the
Chemical Process Industry**

Francis X. McConville

Sensor

Support

2nd Edition

Contents

1 The Pilot Plant

Role of the Plant • Factors in Scale-Up • Some Do's and Don'ts • Tips for Developing Scalable Reactions • Calorimetry/Safety Screening • Haz-Ops • Flow Diagrams • Batch Records • GMP

2 Equipment and Operations

Equipment Train • Reactors • Agitation • Raw Material Charging • Reaction Control • Sampling • Workup • Distillation • Crystallization • Isolation/Filtration • Drying • Equipment Cleaning

3 Liquid Handling

Pumps • Pump Sizing, Selection and Troubleshooting • Pipes, Fittings and Valves • Flanges and Gaskets • Hose • Friction and Viscosity Effects • O-rings • Stoppers • Liquid Storage Vessels

4 Heat Transfer

Heat Transfer in Stirred Vessels • Heat Exchangers • Temperature Control Units • Heat Transfer Fluid Selection and Properties • Glycols and Brines • Steam • Process Chillers

5 Electricity and Instrumentation

Electrical Safety • Electric Power Basics • Receptacle Types • Electrical Enclosure Data • Intrinsic Safety • Motors • Temperature, Pressure and pH Measurement • Process Control Basics

6 Solvents

Safe Handling • Properties and Selection • Solubility Map • Temperature/Vapor Pressure Relationships • Distillation • Binary Azeotropes • Ternary Water-Containing Azeotropes • Water Data

7 Compressed Gases

Safe Handling • Physical Properties • Cryogenic Liquids • Cylinder Specifications • Connection Data • Pressure Regulators • Gas Metering • Air Data • Air Compressors • Vacuum Systems

8 Chemical Data

Properties of Acids and Bases • Dilutions • pKas • pH Buffers • Color Indicators • Aqueous Solubility Data • Aqueous Solution Density • Organic Functional Groups • Reaction Types

9 Chemical Hygiene and Safety

Safe Handling of Chemicals • MSDSs • Hazards Classifications • Labeling • Fire Safety • Personal Protective Equipment • Glove Selection • Respirators • Incompatible Chemicals

10 Materials Selection

Properties of Elastomers, Plastics, Metals and Glass • Metallic Corrosion Data • Glass Corrosion • Material Compatibility Table

11 Miscellaneous

Unit Conversion Tables • Physical Constants • Mathematical Relationships • Geometric Formulas • Temperature/Pressure Conversion Charts • Cold Mixtures • Sieve Sizes • Agency Acronyms

Bibliography

Additional Recommended Reading

Index