

### FEATURE REPORTS

#### Part I: Methods for solving the Colebrook equation for pipe flow problems

**Summary:** The Colebrook equation is used to determine hydraulic resistance for turbulent flow in rough- and smooth-surface pipes. The friction factor of the equation is a complex function of surface roughness and Reynolds number. This article examines several approaches to solving the Colebrook equation in pipe flow problems.

**Related equipment and services:** Pipes, tubes and fittings, couplings for liquid handling, simulation software for turbulent pipe flow

#### Part II: Comparison of equations for turbulent flow friction

**Summary:** The Nikuradse-Prandtl-von Karman (NPK) equation is a widely used expression to determine the friction factor in smooth pipes. It implicitly relates the friction factor to the Reynolds number, and a number of empirical approximations have been proposed to simplify the practical use of the NPK equation. The Lambert W function has been used to determine the accuracy of numerous approximations of the NPK equation. This article explores the use of the Lambert W function to compare two alternate representations of friction factor equations.

**Related equipment and services:** Pipes, tubes and fittings, couplings for liquid handling, simulation software for turbulent pipe flow

#### Distillation optimization by vapor recompression

**Summary:** Distillation is one of the most extensively used operations in the chemical process industries (CPI), and it is highly energy intensive. Vapor-recompression-assisted distillation is one technique to reduce energy consumption by utilizing the energy from the column overhead stream, with added external mechanical energy, to boil the bottom stream. This article illustrates the technique through an example of a typical C3-splitter (propane-propylene splitter) design wherein significant energy savings are achieved by using vapor recompression distillation.

**Related equipment and services:** Distillation columns and associated equipment including internal components, such as trays and packing; pumps; compressors; nozzles; piping; engineering services and software that help design and troubleshoot fractionation columns; distillation simulation software

### NEWSFRONT

#### Regulatory compliance

**Summary:** This article will highlight some of the impending, broad regulatory compliance challenges that are in store for the chemical process industries (CPI) and address the technological implications and solutions that are helping to address them.

**Related equipment and services:** Regulatory compliance software and services

Submit editorial content for consideration to editor-in-chief Rebekkah Marshall (rmarshall@che.com)

#### Screening

**Summary:** Screening is an important operation in many sectors of the chemical process industries (CPI) for classification of powders. This month's Newsfront will present the latest in screening technology.

**Related equipment and services:** Screens and screening systems

Submit editorial content for consideration to contributing editor, Joy LePree (jlepree@che.com)

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### FRACTIONATION COLUMN

**Summary:** This monthly column in *CE* is written by the technical director at Fractionation Research Inc., a consortium of end-users, engineering companies and distillation equipment providers that pool budgets on distillation research.

**Related equipment and services:** Distillation towers, trays and packings, tower-scanning equipment and services

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### FACTS AT YOUR FINGERTIPS

#### Flowmeters

**Summary:** This one-page reference will discuss the advantages and drawbacks associated with the operating principles of different types of flowmeters.

**Related equipment and services:** Velocity flowmeters, mass flowmeters, inferential flowmeters, and positive displacement flowmeters and related instruments and products

### ENGINEERING PRACTICE

#### Thermodynamic analysis of electrolyte systems

**Summary:** Methodical modeling of electrolyte systems is essential in accurately predicting the dynamics of their phase and chemical equilibria at different operating conditions. Good quality expressions for thermodynamic equilibrium constants combined with a suitable activity coefficient model plus mass balance and electroneutrality relations can be used to simulate the behavior of ionic solutions under equilibrium. This month's Engineering Practice provides a concise outline of modeling the thermodynamic equilibrium of electrolyte solutions. The outline includes an overview of a number of useful activity coefficient models as well as a new approach to express the thermodynamic equilibrium constants.

**Related equipment and services:** Simulation software, databases of thermodynamic properties

#### Condition monitoring for rotating machinery

**Summary:** Complex rotating machinery, such as pumps, compressors, gas turbines, steam turbines, electric motors and others, play a crucial role at most CPI facilities. The use of a well-designed condition-monitoring system — which involves the strategic use of sensors to support efforts related to data analysis, predictive maintenance and failure root-cause analysis — has numerous technical and financial benefits. This article discusses the basic requirements of a condition-monitoring program and provides useful tips for getting started.

**Related equipment and services:** Pumps, compressors, gas and steam turbines, electric motors, drive and transmission systems, gears, bearings, rotors and auxiliaries, lubricants

### FOCUS Valves

**Summary:** The March focus on valves will present recently introduced valves, actuators, positioners.

**Related equipment and services:** All types of valves, actuators and positioners; diagnostics for valves.

Submit editorial content for consideration to senior editor, Gerald Ondrey (gondrey@che.com)

### SHOW PREVIEW

#### INTERPHEX 2012

**Summary:** This section will include brief descriptions of some of the products and services slated to be displayed on the exhibit floor during the INTERPHEX tradeshow in New York.

**Related equipment and services:** Any product or service offered by companies exhibiting at INTERPHEX

### *European Special Section*

**Engineering professionals all over the world will read this report to learn about leading suppliers in Europe and what they have to offer the CPI. Don't miss this special advertising opportunity!**

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