

4-Day Master Course

Pre-treatment, Membrane Fouling and Scaling

Prof. Jan C. Schippers
September 25–28, 2017
Rome, Italy

The course includes theory and practice of pre-treatment, fouling and scaling in ultra- and micro-filtration applied for drinking and industrial water production. The impact of the water source – seawater, river water, brackish groundwater and (treated domestic) waste water – will be discussed in depth.

Topics:

Introduction

- Desalination and membrane related technologies. Water sources, applications, capacities and cost.

Ultra- and microfiltration

- Summarizing principles. Membrane materials, pore size, flux, normalizing permeability and fouling mechanisms.
- Overview ultra- and micro-filtration elements and systems.
- Fouling in MF/UF systems, fouling control and pre-treatment.

Reverse osmosis and nano-filtration

- Summarizing principles. Flux, salt passage, rejection and concentration polarization.
- Overview of RO and NF membranes and elements. Single and multiple staging.
- Summarizing process design of RO systems with spiral wound elements. Osmotic pressure, Net driving pressure. Permeate quality and flux.
- Normalizing data in RO and NF systems in practice.
- Fouling in RO and NF systems. Spacer and bundle fouling. Suspended and colloidal matter, iron and manganese, biofouling, organic fouling and scaling.
- Conventional pre-treatment techniques for RO and NF. Media filtration, coagulation, sedimentation and flotation.

Particulate fouling and pre-treatment

- Fouling due to suspended and colloidal matter. Mechanisms of fouling.
Parameters to predict fouling. SDI/MFI (0.45) and MFI-UF.
- Value of fouling predictions with SDI/MFI (0.45) in RO/NF and UF systems.
- Fouling due to algae and Transparent exo polymers in RO/NF and UF systems.
- Fouling due to coagulants in RO/NF systems.
- Pre-treatment in practice for removal of suspended and colloidal matter for RO/NF.
- Fouling control of iron and manganese in groundwater.

Bio-fouling and pre-treatment

- Pre-treatment for bio-fouling, principles, parameters AOC and BDOC, membrane fouling simulator, biocides.
- Fouling due to organic matter. Oil compounds, anti-scalants and coagulant aids.
- Fouling control in membrane bio-reactors.

Scaling and anti-scalants

- Principles of scaling and prediction with computer program.
- Manual calculations of scaling due to silica, calcium, barium strontium sulphate and calcium fluoride. Calculation of the Stiff and Davis Index to predict scaling of calcium carbonate.
- Scaling in seawater reverse osmosis.
- Scaling control, monitoring and anti-scalants.

Chemical cleaning in place (CIP)

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Prof. Jan C. Schippers, MSc, PhD

September 25–18 , 2017

Rome, Italy

REGISTRATION FORM

Surname _____ Name _____

Affiliation _____

Address _____

Country _____ Telephone _____

Fax _____ Email _____

Registration fee:

EDS members **€2,500**

Non-members **€2,700**

The fee includes 5 nights accommodation, lunches, coffee, dinners and course workbook.

Payment can be made by:

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