

DESALINATION ENGINEERING

by Mohamed Ali Darwish

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This book is the outline of the author's experience on water desalination over forty years working in research and academia. It was written for students for both graduate and undergraduate levels as well as practitioners in the field of seawater desalination. It covers the basic of thermal desalination processes: multi-effect (ME), multi-stage flash (MSF), mechanical vapor compression (MVC), and thermal vapor compression (TVC), as well as the most used membrane technology, reverse osmosis (RO). Since large thermal desalination units are usually combined with power plants, a chapter on cogeneration power



desalting plants (CPDP) producing both electric power and desalted seawater is included. A

general outline of the book:

Introduction: Water in the World

Water in the Gulf Cooperation Council Countries (GCC)

Viable options to satisfy freshwater needs

The Qatar water case

Food

Desalination Processes

Multi-stage flash (MSF)

Multi-effect distillation

(MED) Vapor compression

Reverse osmosis (RO)

Factors affecting the choice of a desalting system

Hybrid desalting systems

Multi-Effect Desalination (MED)

Single-effect submerged tube system

MEB desalination system and its arrangement

Modern MEB with regenerative heating system

Typical conventional MEB units

Multi-Stage Flash (MSF)

Mechanical Vapor Compression (MVC)

Thermal Vapor Compression (TVC)

Single-effect TVC system

Multi-effect thermal vapor compression (ME-TVC)

system Reverse Osmosis (RO)

RO background

Water chemistry related to RO

Membrane module configuration and arrangements

Basic equations and definitions

Water intakes, possible foulants, and pretreatment

Feed water treatments to prevent scale formation

Post-treatment

RO system design

Case studies

RO system design using ROSA



Balaban Desalination Publications

Cogeneration Steam Power Desalting Plants (CPDP) using Steam Turbines
Desalting plants and their energy supply
Methods of supplying energy to desalting systems
The Rankine cycle and its development
Combining steam turbines with thermally operated desalting plants
Fuel allocation between desalted water and power
Main characteristics of CPDP using steam turbines General
rating of the CPDP as a whole and its components Case studies
Examples using gas turbines in CPDP

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Professor Mohamed Ali Darwish is a Mechanical Engineer with a B.Sc. from Alexandria University in 1960, and a Ph.D. from Kansas State University in 1969.

He taught desalination in King Abdel Al-Aziz University from 1976 to 1985 and in Kuwait University from 1985 to 2009. He worked as a consultant to the Kuwait Foundation for the Advancement of Science (KFAS) from 2009 to 2011, and in the Qatar Environment and Energy

Research Institute from 2011 to present. He has more than 100 publications in peer reviewed journals as well as several books. He received several awards from the International Desalination Association (IDA) for outstanding contributions to the field of desalination science, and from the College of Engineering, Kuwait University as a best researcher.

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