

Crustal Permeability

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WILEY

This edition first published 2017 © 2017 by John Wiley & Sons Ltd

Registered office: John Wiley & Sons, Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

Editorial offices: 9600 Garsington Road, Oxford, OX4 2DQ, UK
The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK
111 River Street, Hoboken, NJ 07030-5774, USA

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Library of Congress Cataloging-in-Publication Data applied for

ISBN: 9781119166566

A catalogue record for this book is available from the British Library.

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books.

Cover image: Roc Canals © Photography/Gettyimages

Set in 9/12pt, GalliardStd by SPi Global, Chennai, India.

10 9 8 7 6 5 4 3 2 1

We dedicate this book to our families who support and inspire us, and to Henry Darcy whose legacy of solving both scientific and practical problems continues to guide the discipline of hydrogeology.

Conversion factors for permeability and hydraulic-conductivity units

In this book we emphasize the use of permeability (k) and SI units (m^2) as the measure of ease of fluid flow under unequal pressure. However hydraulic conductivity (K) and a variety of other units are used in practice. Permeability is a rock property, whereas hydraulic conductivity reflects both rock and fluid properties (fluid viscosity and density) – see Chapter 1. The approximate conversion from k to K here assumes that the fluid is water at standard temperature and pressure. Water viscosity varies by a factor of ~ 26 and water density by a factor of ~ 3 between 0°C and the critical point of water. Other fluids such as hydrocarbons can exhibit

much larger viscosity ranges. In the table below, we show the unit conversion for 1 m^2 as well as 10^{-15} m^2 which is a more realistic permeability for geological materials.

		Permeability, k		Hydraulic conductivity, K	
	cm^2	Darcy	m s^{-1}	m d^{-1}	ft d^{-1}
$1\text{ m}^2 =$	10^4	10^{12}	10^7	9×10^{11}	3×10^{12}
$10^{-15}\text{ m}^2 =$	10^{-11}	0.001 (1 mD)	10^{-8}	9×10^{-4}	3×10^{-3}

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About the companion websites

This book is accompanied by two companion websites:

One website includes:

- Powerpoints of all figures from the book for downloading

www.wiley.com/go/gleeson/crustalpermeability/

The other website includes:

- A persistent data portal for sharing crustal-permeability data

<http://crustalpermeability.weebly.com/>