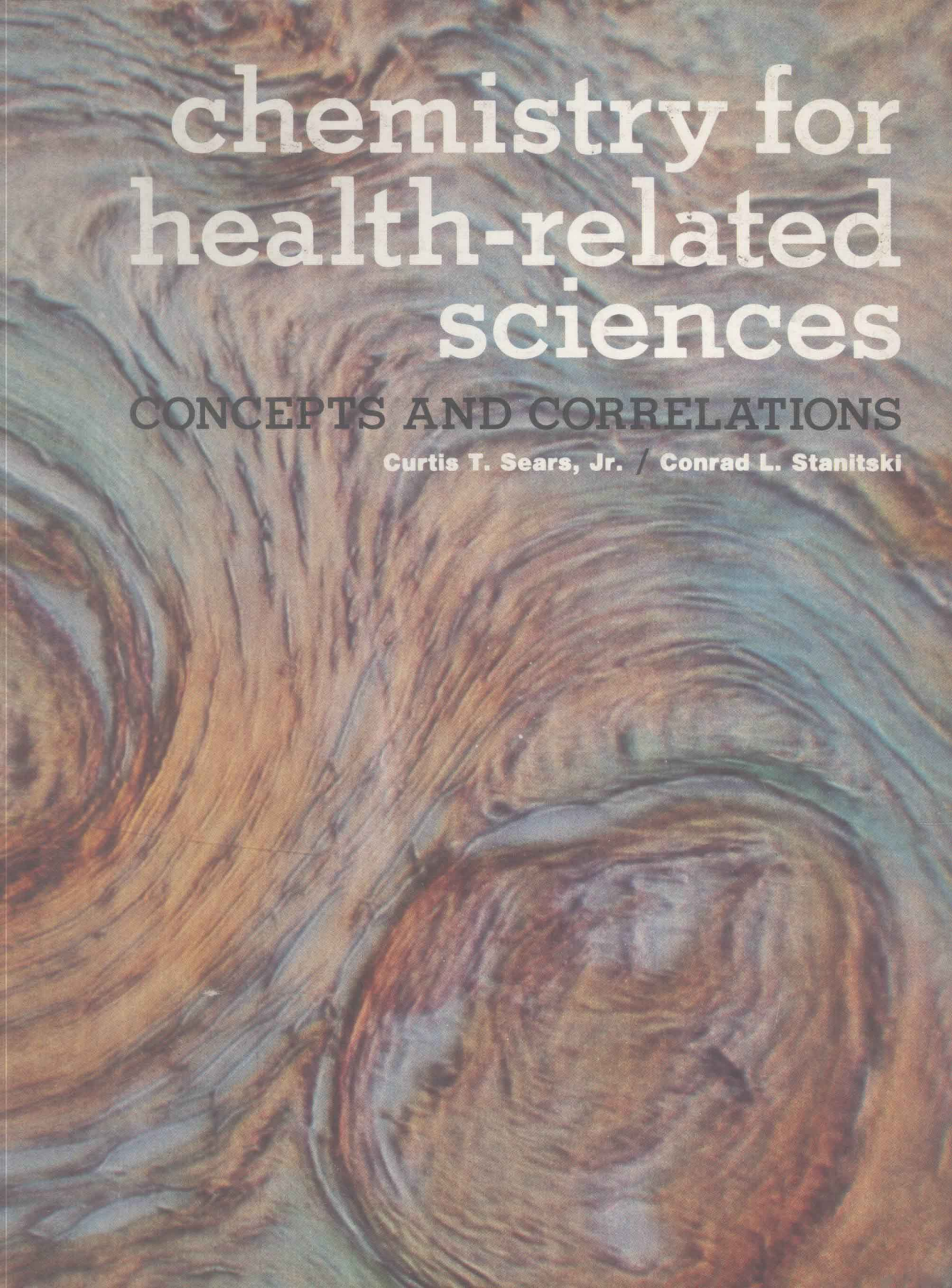

chemistry for health-related sciences

CONCEPTS AND CORRELATIONS

Curtis T. Sears, Jr. / Conrad L. Stanitski

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Library of Congress Cataloging in Publication Data

SEARS, CURTIS T
Chemistry for health-related sciences.

Includes index.
1. Chemistry. I. Stanitski, Conrad L., joint author. II. Title. [DNLM: 1. Chemistry. QD31.2 S439c]
QD31.2.S43 540 75-20283
ISBN 0-13-129429-6

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10 9 8 7 6 5 4 3 2

Printed in the United States of America

The cover photograph, courtesy of Dr. Roman Vishniac, is an interference microscopy photomicrograph showing living human skin cells. The original magnification was 460 times; for use on the cover, the subject has been further enlarged photographically to 5700 times.

PRENTICE-HALL INTERNATIONAL, INC., *London*
PRENTICE-HALL OF AUSTRALIA PTY. LIMITED, *Sydney*
PRENTICE-HALL OF CANADA, LTD., *Toronto*
PRENTICE-HALL OF INDIA PRIVATE LIMITED, *New Delhi*
PRENTICE-HALL OF JAPAN, INC., *Tokyo*
PRENTICE-HALL OF SOUTH-EAST ASIA PRIVATE LIMITED, *Singapore*

Curtis T. Sears, Jr. / Conrad L. Stanitski
Georgia State University

Prentice-Hall, Inc., Englewood Cliffs, New Jersey

chemistry for health-related sciences

With love to our children
Amy
Beth
Leslie
Susan

Science is built up of facts as a house is with stones, but a collection of facts is no more a science than a heap of stones a house.

Poincaré (1854–1912)

to the reader

Our purpose in writing this text is to provide one specifically designed for a chemistry course for students of the allied health sciences. Topics are introduced and discussed around the unifying theme that chemical structure and biological function are related. The thrust is to use biochemically significant substances and phenomena as a framework to describe chemical principles. Therefore, we have chosen to present only those topics most directly related to understanding biochemical processes, rather than attempt a broad introductory coverage of chemistry. Consequently, some topics usually included in an introductory chemistry course have been shortened in scope or omitted. Among omitted topics are: gas laws, electrolysis, galvanic cells, chemical behavior of individual elements, and industrial processes. For the most part, we have not dwelt upon the historical development of present chemical theories.

The basic principles of atomic structure are established early. Immedi-

ately after discussion of atomic structure, all aspects of bonding are considered. The theme of electron transfer focuses the relationships between ion formation, aggregation, and oxidation–reduction. In addition to the usual topics presented under the heading of electron sharing, the ideas and consequences of structural and geometric isomerism are brought forth at this time. The establishment of this working background makes possible the early introduction of biologically important examples. We have attempted to apply chemical principles and show the reasons why health care personnel need to be familiar with them. As a result, the organization and integrated treatment of topics is unusual by comparison with many other texts. For example, in this text: (1) enzymatic catalysis is included within the discussion of reaction rates; (2) oxygen–hemoglobin binding is incorporated into the discussion of acid-base equilibria and buffer action; (3) the studies of aqueous equilibria and factors affecting them are related to diabetes mellitus and respiratory acidosis/alkalosis.

In presenting the nature of biochemically-significant materials, the text continuously uses principles established earlier. It incorporates features of structure and reactivity as they relate to metabolic interactions, drug action, and hereditary diseases. We believe the approach has a sound basis in terms of chemical coherence and avoids the traditional and arbitrary division of chemistry under the headings inorganic, organic, and biological chemistry.

The text is designed to consolidate and build upon principles normally treated in high school chemistry courses, although high school chemistry is not a prerequisite.

We have interspersed exercises throughout each chapter. Each exercise relates to the section under consideration. In this way, the exercises provide continuous points at which understanding of previous material can be checked. End-of-chapter problems of a broader nature are also included. Their solutions require the successful coordination of several concepts and thus serve to intergrate previous material with the chapter under study.

A laboratory program has been developed to accompany this text. This program uses qualitative and quantitative analyses of the body fluids, urine and serum, to amplify the importance of stoichiometry and equilibrium.

We would like to thank the many individuals who have helped bring our ideas to fruition. Special thanks go to the staff at Prentice-Hall, particularly our editor Harry McQuillen for his expertise, coffee, and skyscraper tour. Thanks also to our copy editor Betty Adam for recalling to us principles of freshman English, to Barbara N. Bartlett for her continuous optimism and cheerfulness, and to our typist Marilyn Chapman for deciphering our scratchings. We appreciate the efforts of all our reviewers for their critical comments and suggestions, especially Lawrence Wilkins (Santa Monica College) and Chuck Rose (University of Nevada, Reno). Our families deserve special mention for tolerating missed meals, absence, and occasional displays of maltemper.

Most of all we are indebted to the Georgia State University Chemistry 101 and 102 students who inspired us to undertake this project. These

marvelous people are from the allied health programs at Georgia State and from Crawford Long, Grady, and Piedmont Hospitals' Schools of Nursing. If their cooperative spirit shown during this effort translates to their health care practices, getting sick won't be that bad after all.

Throughout the text we have strived to put chemistry into a medical perspective. We solicit your opinions on our efforts.

C.T.S.
C.L.S.
Atlanta, Ga.

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