

**CHEMISTRY OF URINE: A
PRACTICAL GUIDE TO THE
ANALYTICAL EXAMINATION OF
DIABETIC, ALBUMINOUS AND
GOUTY URINE**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649103386

Chemistry of urine: a practical guide to the analytical examination of diabetic, albuminous and gouty urine by Alfred H. Allen

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

ALFRED H. ALLEN

**CHEMISTRY OF URINE: A
PRACTICAL GUIDE TO THE
ANALYTICAL EXAMINATION OF
DIABETIC, ALBUMINOUS AND
GOUTY URINE**

(5)

I

12/27

CHEMISTRY OF URINE

CHEMISTRY OF URINE

A PRACTICAL GUIDE TO THE

ANALYTICAL EXAMINATION OF DIABETIC, ALBUMINOUS, AND GOUTY URINE

ALFRED H. ALLEN, F.I.C., F.C.S.

PAST PRESIDENT OF THE SOCIETY OF PUBLIC ANALYSTS; LATE LECTURER ON THEORETICAL
AND PRACTICAL CHEMISTRY IN THE SCHOOL OF MEDICINE, SHEFFIELD; PUBLIC
ANALYST FOR THE WEST RIDING OF YORKSHIRE, THE
CITY OF SHEFFIELD, ETC.;
AUTHOR OF "COMMERCIAL ORGANIC ANALYSIS."



LONDON
J. & A. CHURCHILL
11 NEW BURLINGTON STREET

1895

PREFACE.

A CONSIDERABLE portion of the contents of this book was designed to form part of the concluding volume of my "COMMERCIAL ORGANIC ANALYSIS." Vol. III., Part 3rd, of that work deals mainly with substances of animal origin, and will complete the chief literary work of my life. But, of late, circumstances have led me to devote much attention to the chemical examination of urine, especially in relation to certain pathological conditions of great importance in Life Assurance reports, as well as in clinical diagnosis and prognosis. These examinations have caused me to investigate critically a large number of the analytical methods which are in vogue for the examination of urine, especially for sugar and albumin, and to confirm or disprove certain statements generally accepted as facts.

The results of this extensive laboratory work may be of assistance to many interested in Urinary Analysis. Physicians who are called on to advise as to the acceptance or rejection of candidates for Life Assurance often find this duty very onerous. Prognosis with regard to patients who may be suffering from glycosuria or albuminuria is a difficult and

anxious task ; and the more so as this task is one upon the performance of which the patient's immediate future is to cast so critical a light. Probably, also, there are analysts who will welcome this collection of analytical facts and methods.

While attempting to bring the majority of the tests and processes within the scope of everyday clinical diagnosis, or of the reports required for Life Assurance, I have also described other methods which cannot be applied except by those accustomed to analytical work, and who are possessed of the appliances of a well-appointed laboratory.

While desiring to give special prominence to the methods of examining diabetic, albuminous, and gouty urine, it appeared undesirable to omit all reference to subjects of collateral interest, such as the proportions of urea and total nitrogen in urine, the recent researches on creatinine and on xanthine derivatives, and the behaviour of urinary colouring matters. On the other hand, the book is not planned as a *complete* guide to Urinary Analysis. Thus, I have omitted all mention of the methods of determining phosphates and most of the other mineral constituents of urine ; firstly, because they are not of great pathological interest, and secondly, because I have nothing to say about them which cannot be found in every physician's and analyst's library. Should this production meet with such a reception as to call for the issue of a second edition, it may be desirable to supply this and other omissions.

It is with great pleasure that I acknowledge the valuable assistance rendered me by Dr James Edmunds,

of Dover Street, Piccadilly, to whom I am greatly indebted for the perusal of the whole of the proofs, and for many valuable suggestions, both scientific and literary. I am also obliged to Messrs A. W. Gerrard, F. G. Hopkins, and G. Stillingfleet Johnson for the perusal and correction of particular proof-sheets. Much time and labour have been devoted in my laboratory to the examination of many of the tests and processes described, and my cordial thanks are due to Mr G. Bernard Brook and Mr Arnold R. Tankard for their zealous and painstaking assistance in this arduous work.

The progress of further investigations which I have in hand would be materially facilitated by increased opportunities of examining abnormal specimens of urine. I therefore take this opportunity of soliciting the co-operation of clinical workers, who would greatly oblige me by forwarding for examination specimens of any urines which appear to justify such a course. There is reason to believe that some of the less known constituents of urine, such as glycuronic acid and its compounds, creatinine, xanthine, the indoxyl and skatoxyl derivatives, and particular pigments, are greatly augmented under certain pathological conditions at present not fully understood, and the systematic examination of urines of abnormal character would probably materially extend our knowledge of this difficult and obscure subject. In sending such samples, I would request that the urine be poured into a clean, strong eight-ounce bottle, which should then be at once securely corked, carefully packed, and distinctly labelled, with the date and hour of passing, and with

the name and address of the sender. The sample should be forwarded at once by parcel-post, and full information as to the patient's history should be sent to me at the same time by letter-post. Of course the complete examination of urine for abnormal constituents cannot be effected on so small a quantity as eight ounces, but this amount will suffice to ascertain whether a more extended analysis of urine from the same source is desirable.

ALFRED H. ALLEN.

67, SURREY STREET,
SHEFFIELD, *June 1st, 1895.*

CONTENTS.

GENERAL COMPOSITION OF URINE.

| | PAGE |
|--|------|
| CONSTITUENTS OF URINE, | 1 |
| Analyses of Urine, 3; Quantity of Urine, 3; Influence of Food on Urine, 5. | |

PRELIMINARY EXAMINATION OF URINE.

| | |
|---|---|
| PHYSICAL AND GENERAL CHARACTERS OF URINE, | 7 |
| Volume, 7; Appearance, 7; Urinary Sediments, 8; Odour, 8; Taste, 9; Reaction of Urine, 9; Determination of Acidity and Alkalinity of Urine, 10; Specific Gravity and Total Solids of Urine, 11. | |

DIABETIC URINE.

| | |
|---|----|
| CHARACTERS OF DIABETIC URINE, | 14 |
| Existence of Sugar in Normal Urine, 17. | |

| | |
|---|----|
| CARBOHYDRATES OF URINE, | 21 |
| Constitution of Carbohydrates, 21; Dextrose or Grape-Sugar, 22; Lævulose or Fruit-Sugar, 26; Lactose or Milk-Sugar, 29; Maltose, 31; Sucrose or Cane-Sugar, 31; Dextrin, 31; Animal Gum, 31; Glycogen, 32; Inosite, 35; Glycuronic Acid, 37; Glycosuric Acid, 41. | |

| | |
|--|----|
| DETECTION AND DETERMINATION OF SUGAR IN URINE, | 42 |
| Isolation of Sugar from the Urine, 43; Fermentation Test for Sugar, 44; Polarimetric Determination of Diabetic Sugar, 49; Detection and Determination of Diabetic Sugar by its Reducing Action, 50; Behaviour of Urinary Constituents with Precipitants and Oxidising Agents, 53; Reaction of Glucose with Copper Solutions, 56; Trommer's Test, 58; Fehling's Test, 58; Substances reducing Fehling's Solution, 59; Modified Fehling's Test, 62; Pavy's Ammoniacal Cupric Solution, 66; | |