

CHEMICAL EXPERIMENTS

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649471690

Chemical Experiments by Wyatt W. Randall & Ira Remsen

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

WYATT W. RANDALL & IRA REMSEN

**CHEMICAL
EXPERIMENTS**

CHEMICAL EXPERIMENTS

PREPARED TO ACCOMPANY REMSEN'S "INTRO-~~DUCTION~~³⁴³⁰
DUCTION TO THE STUDY OF CHEMISTRY"

BY

IRA REMSEN

Professor of Chemistry in the Johns Hopkins University.

AND

WYATT W. RANDALL

Associate in Chemistry in the Johns Hopkins University

LANE LIBRARY



NEW YORK
HENRY HOLT & COMPANY

1885

NY

Copyright, 1935,
BY
HENRY HOLT & CO.

YASSEL I MAI

ROBERT DRUMMOND, ELECTROTYPHER AND PRINTER, NEW YORK.

R 2 11
12 25

PREFACE.

THIS book has been prepared for use as a laboratory guide to accompany the study of Remsen's "Introduction to the Study of Chemistry." The experiments included in the course are essentially those in the last edition of the "Introduction." Minor changes have been made in many of them; essential changes in a few. If the directions are followed, the average student will experience no difficulty in carrying them out successfully.

The numbering of the experiments in the "Introduction" has been followed in this book; additional experiments have been inserted, and designated as "15a," "25a," "25b," etc. In the latter class will be found a small number of experiments not contained in the "Introduction," but which have been inserted here in accordance with the recommendation of the Committee on Secondary School Studies, whose report was published by the United States Bureau of Education in 1893. As many of the experiments there recommended have been inserted as seemed to the authors to be of advantage to the student following this course, the time at disposal and the facilities of the average laboratory being taken into account.

In some cases it may be that in laboratories not completely equipped fairly satisfactory results may be obtained with simpler apparatus. The effort has, however, been made in this book to omit everything

which does not serve to insure the success of the experimental work.

It has seemed best to include all the experiments contained in Remsen's "Introduction to the Study of Chemistry." There are, however, a number of these which are not suited to general laboratory practice: they should be reserved for the lecture-room, or at most performed only with the assistance of a competent teacher. In this University the experiments in the "Introduction" usually omitted from the general laboratory course are Nos. 4, 25, 26, 28, 34, 43, 45, 47, 48, 56.

As many as possible of those omitted should be performed by the teacher in the presence of the class; and the points of importance should be drawn out by questions. Afterwards the pupils should write a full account of what they have seen, and draw such conclusions as the experiments may lead to.

THE AUTHORS.

BALTIMORE, September, 1895.

LIST OF EXPERIMENTS.

1. Physical and chemical change.
2. Heat " " "
3. " " " "
4. The electric current and chemical change.
5. Manipulation of gases.
6. " " "
7. Mechanical mixture: recognition of ingredients.
8. " " separation " "
9. " " " " "
10. " " conversion by heat into a chemical compound.
11. Contact and chemical change.
12. " " " "
13. " " " "
14. " " " "
15. " " " "
- 15a. Oxygen: from mercuric oxide.
16. " " potassium chlorate.
17. " " manganese dioxide.
18. " " potassium chlorate and manganese dioxide.
19. Physical properties of oxygen.
20. Action of oxygen at ordinary temperature.
21. " " " on sulphur at high temperatures.
22. " " " " carbon " " "
23. " " " " phosphorus " " "
24. " " " " steel at " " "
25. Absorption of oxygen by iron at " "
- 25a. Oxidation in the air.
- 25b. " " " "
26. Hydrogen: electrolysis of water.
27. " action of sodium on water.
28. " " " iron " "
29. " " " zinc on acids.
30. Products of the action of zinc on acids.

31. Hydrogen: purification.
32. " physical properties.
33. " " "
34. " " "
35. " burning in air.
36. " does not support combustion.
37. Water included in porous substances.
38. " of crystallization.
39. " " "
40. " " "
41. Efflorescent compounds.
42. Deliquescent "
43. Water composed of oxygen and hydrogen.
44. " produced by the burning of hydrogen in air.
45. Electrolytic gas.
46. Action of hydrogen on hot copper oxide.
47. Oxyhydrogen blowpipe.
48. " " " , lime-light.
49. Distillation of water.
- 49a. Water as a solvent.
- 49b. Solution with and without permanent chemical change.
- 49c. Solution aids chemical action.
- 49d. " " " "
50. Weight of oxygen in a given weight of potassium chlorate.
51. Atomic weight of zinc.
52. Action of sulphuric acid on salt.
53. Oxygen from manganese dioxide and sulphuric acid.
54. Chlorine.
55. Action of chlorine on compounds of hydrogen.
56. " " " " " " "
57. Direct combination of chlorine and hydrogen.
58. Hydrochloric acid.
59. Preparation of potassium chlorate.
60. " " bleaching-powder.
61. Neutralization: quantitative relations.
62. " formation of salts.
63. Air: proportion of oxygen.
64. " nitrogen.
65. " water-vapor.
66. " carbon dioxide.
67. " removal of carbon dioxide.

68. Air : formation of carbon dioxide.
69. " removal of water-vapor.
70. Ammonia.
71. "
72. " acts as a base.
73. Direct combination of ammonia with volatile acids.
74. Nitric acid : preparation.
75. " " concentration.
76. " " as an oxidizing agent.
77. " " " " " "
78. " " " " " "
79. " " , formation of nitrates
80. Action of nitrates under the influence of heat.
81. Solubility of nitrates in water.
82. Nitric acid reduced to ammonia.
83. Nitrous acid and nitrites.
84. Nitrous oxide.
85. Nitric oxide : preparation.
86. " " properties.
- 86a. " " analysis.
87. Carbon : use of bone-black for filters.
88. " direct union with oxygen.
89. " action upon metallic oxides.
90. " " " " " "
91. Carbon dioxide : formation in the lungs.
92. " " preparation from carbonates.
93. " " properties.
94. Formation of carbonates.
95. " " "
96. Solution of calcium carbonate.
97. Carbon monoxide : preparation.
98. " " as a reducing agent.
99. Oxygen burning in an atmosphere of coal-gas.
100. Flame.
101. Reduction with the aid of the blowpipe.
102. Oxidation " " " " " "
103. Bromine.
104. Action of sulphuric acid on bromides.
105. Iodine.
106. Solvents for iodine.
107. Iodine and starch.