

CONVERSATIONS
ON
CHEMISTRY;
IN WHICH
THE ELEMENTS OF THAT SCIENCE
ARE
FAMILIARLY EXPLAINED
AND
ILLUSTRATED BY EXPERIMENTS.

IN TWO VOLUMES.

The Fifth Edition, revised, corrected, and considerably enlarged.



LONDON:

PRINTED FOR LONGMAN, HURST, REES, ORME, AND BROWN,
PATERNOSTER-ROW.

1817.

Printed by A. Strahan,
Printers-Street, London.

ADVERTISEMENT.

THE Author, in this fifth edition, has endeavoured to give an account of the principal discoveries which have been made within the last four years in Chemical Science, and of the various important applications, such as the gas-lights, and the miner's-lamp, to which they have given rise. But in regard to doctrines or principles, the work has undergone no material alteration.

London, July, 1817.

v

PREFACE.

IN venturing to offer to the public, and more particularly to the female sex, an Introduction to Chemistry, the author, herself a woman, conceives that some explanation may be required; and she feels it the more necessary to apologise for the present undertaking, as her knowledge of the subject is but recent, and as she can have no real claims to the title of chemist.

On attending for the first time experimental lectures, the author found it almost impossible to derive any clear or satisfactory information from the rapid demonstrations which are usually, and perhaps necessarily, crowded into popular courses of this kind. But frequent opportunities having afterwards occurred of conversing with a friend on the subject of chemistry, and of repeating a variety of experiments, she became better acquainted with the principles of that science, and began to feel highly interested in its pursuit. It was then that she perceived, in attending the excellent lectures delivered at the Royal Institution, by the present Professor of Chemistry, the great advantage which her previous knowledge of the subject, slight as it was, gave her over others who had not enjoyed the same means of

private instruction. Every fact or experiment attracted her attention, and served to explain some theory to which she was not a total stranger; and she had the gratification to find that the numerous and elegant illustrations, for which that school is so much distinguished, seldom failed to produce on her mind the effect for which they were intended.

Hence it was natural to infer, that familiar conversation was, in studies of this kind, a most useful auxiliary source of information; and more especially to the female sex, whose education is seldom calculated to prepare their minds for abstract ideas, or scientific language.

As, however, there are but few women who have access to this mode of instruction; and as the author was not acquainted with any book that could prove a substitute for it, she thought that it might be useful for beginners, as well as satisfactory to herself, to trace the steps by which she had acquired her little stock of chemical knowledge, and to record, in the form of dialogue, those ideas which she had first derived from conversation.

But to do this with sufficient method, and to fix upon a mode of arrangement, was an object of some difficulty. After much hesitation, and a degree of embarrassment, which, probably, the most competent chemical writers have often felt in common with the most superficial, a mode of division was adopted, which, though the most natural, does not always admit of being strictly pursued—it is that of treating first of the simplest bodies, and then gradually rising to the most intricate compounds.

It is not the author's intention to enter into a minute vindication of this plan. But whatever may be its advantages or inconveniences, the method adopted in this work is such, that a young pupil, who should occasionally recur to it, with a view to procure information on particular subjects, might often find it obscure or unintelligible; for its various parts are so connected with each other as to form an uninterrupted chain of facts and reasonings, which will appear sufficiently clear and consistent to those only who may have patience to go through the whole work, or have previously devoted some attention to the subject.

It will, no doubt, be observed, that in the course of these Conversations, remarks are often introduced, which appear much too acute for the young pupils, by whom they are supposed to be made. Of this fault the author is fully aware. But, in order to avoid it, it would have been necessary either to omit a variety of useful illustrations, or to submit to such minute explanations and frequent repetitions, as would have rendered the work tedious, and therefore less suited to its intended purpose.

In writing these pages, the author was more than once checked in her progress by the apprehension that such an attempt might be considered by some, either as unsuited to the ordinary pursuits of her sex, or ill-justified by her own recent and imperfect knowledge of the subject. But, on the one hand, she felt encouraged by the

establishment of those public institutions, open to both sexes, for the dissemination of philosophical knowledge, which clearly prove that the general opinion no longer excludes women from an acquaintance with the elements of science; and, on the other, she flattered herself that whilst the impressions made upon her mind, by the wonders of Nature, studied in this new point of view, were still fresh and strong, she might perhaps succeed the better in communicating to others the sentiments she herself experienced.

The reader will soon perceive, in perusing this work, that he is often supposed to have previously acquired some slight knowledge of natural philosophy, a circumstance, indeed, which appears very desirable. The author's original intention was to commence this work by a small tract, explaining, on a plan analogous to this, the most essential rudiments of that science. This idea she has since abandoned; but the manuscript was ready, and might, perhaps, have been printed at some future period, had not an elementary work of a similar description, under the title of "Scientific Dialogues," been pointed out to her, which, on a rapid perusal, she thought very ingenious, and well calculated to answer its intended object.

CONTENTS

Page numbers have been retained to give an idea of the relative length of each Conversation.

CONVERSATION I.

ON THE GENERAL PRINCIPLES OF CHEMISTRY.

Page 1

CONVERSATION II.

ON LIGHT AND HEAT.

26

CONVERSATION III.

CONTINUATION OF THE SUBJECT.

70

CONVERSATION IV.

ON COMBINED CALORIC, COMPREHENDING SPECIFIC HEAT AND LATENT HEAT.

122

CONVERSATION V.

ON THE CHEMICAL AGENCIES OF ELECTRICITY.

160

CONVERSATION VI.

ON OXYGEN AND NITROGEN.

181

CONVERSATION VII.

ON HYDROGEN.

214

CONVERSATION VIII.

ON SULPHUR AND PHOSPHORUS.

256

CONVERSATION IX.

ON CARBON.

282

CONVERSATION X.

ON METALS.

314

CONVERSATION XIII.

ON THE ATTRACTION OF COMPOSITION.

1

CONVERSATION XIV.

ON ALKALIES.

19

CONVERSATION XV.

ON EARTHS.

44

[CONVERSATION XVI.](#)

ON ACIDS.

69

[CONVERSATION XVII.](#)

OF THE SULPHURIC AND PHOSPHORIC ACIDS: OR, THE COMBINATIONS OF OXYGEN WITH SULPHUR AND WITH PHOSPHORUS; AND OF THE SULPHATS AND PHOSPHATS.

80

[CONVERSATION XVIII.](#)

OF THE NITRIC AND CARBONIC ACIDS: OR THE COMBINATION OF OXYGEN WITH NITROGEN AND WITH CARBON; AND OF THE NITRATS AND CARBONATS.

100

[CONVERSATION XIX.](#)

ON THE BORACIC, FLUORIC, MURIATIC, AND OXYGENATED MURIATIC ACIDS; AND ON MURIATS.

131

[CONVERSATION XX.](#)

ON THE NATURE AND COMPOSITION OF VEGETABLES.

162

[CONVERSATION XXI.](#)

ON THE DECOMPOSITION OF VEGETABLES.

202

[CONVERSATION XXII.](#)

HISTORY OF VEGETATION.

243

[CONVERSATION XXIII.](#)

ON THE COMPOSITION OF ANIMALS.

276

[CONVERSATION XXIV.](#)

ON THE ANIMAL ECONOMY.

297

[CONVERSATION XXV.](#)

ON ANIMALISATION, NUTRITION, AND RESPIRATION.

314

[CONVERSATION XXVI.](#)

ON ANIMAL HEAT; AND OF VARIOUS ANIMAL PRODUCTS.

336

I.xvi

ERRATA.

Vol. I. page 56. last line but one, for “caloric,” read “calorific.”

179. Note, for “Plate XII.” r. “Plate XIII.”

363

INDEX.

Index links lead only to the top of the page, not to the exact item referenced. Some browsers may not display page numbers correctly. If a link seems to lead to the wrong page, the link is right and the visible page number is wrong.

[A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#)
[L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [Y](#) [Z](#)

U, V are alphabetized as shown. J is not separated from I.

A

Absorbent vessels, [ii. 304](#)
Absorption of caloric, [i. 59.](#) [66](#)
Acetic acid, [ii. 75.](#) [197](#)

L

Lac, [ii. 358](#)
Lactic acid, [ii. 75.](#) [290.](#) [356](#)
Lakes, colours, [ii. 190](#)
Latent heat, [i. 133](#)

Acetous fermentation, [ii. 232](#)
—— acid, [ii. 193. 232](#)
Acidulous gaseous mineral waters, [ii. 129](#)
—— salts, [ii. 200](#)
Acids, [i. 262. ii. 69](#)
Aeriform, [i. 36](#)
Affinity, [i. 19. ii. 1](#)
Agate, [ii. 51](#)
Agriculture, [ii. 252](#)
Air, [i. 182. ii. 262](#)
Albumen, [ii. 277. 288](#)
Alburnum, [ii. 267](#)
Alchemists, [i. 4](#)
Alcohol, or spirit of wine, [ii. 215. 222](#)
Alembic, [i. 258](#)
Alkalies, [ii. 19](#)
Alkaline earths, [ii. 50. 58](#)
Alloys, [i. 344](#)
Alum, or sulphat of alumine, [ii. 55. 95](#)
Alumine, [ii. 54](#)
Aluminium, [i. 13](#)
Amalgam, [i. 347](#)
Ambergris, [ii. 358](#)
Amethyst, [ii. 58](#)
Amianthus, [ii. 66](#)
Ammonia, or volatile alkali, [i. 363. ii. 20. 35](#)
Ammoniacal gas, [ii. 36](#)
Ammonium, [i. 13](#)
Analysis, [i. 287](#)
—— of vegetables, [ii. 165](#)
Animals, [ii. 276](#)
Animal acids, [ii. 75. 290](#)
—— colours, [ii. 292](#)
—— heat, [ii. 337](#)
—— oil, [ii. 178. 283](#)
Animalization, [ii. 276. 297. 315](#)
Antidotes, [ii. 41. 87](#)
Antimony, [i. 14](#)
Aqua fortis, [ii. 105](#)
—— regia, [i. 340. ii. 144](#)
[Arrack](#), [ii. 220](#)
Argand's Lamp, [i. 208](#)
Arsenic, [i. 14. 340. 348](#)
Arteries, [ii. 304. 323](#)

Lavender water, [ii. 184. 224](#)
Lead, [i. 14. 318. 330](#)
Leather, [ii. 193. 287](#)
Leaves, [ii. 260](#)
Life, [ii. 159. 168](#)
Ligaments, [ii. 303](#)
Light, [i. 12. 26. ii. 261](#)
Lightning, [i. 248](#)
Lime, [ii. 59](#)
—— water, [ii. 61](#)
368
Limestone, [ii. 60](#)
Linseed oil, [ii. 178](#)
Liqueurs, [ii. 224](#)
Liver, [ii. 308](#)
Lobes, [ii. 256. 332](#)
Lunar caustic, or nitrat of silver, [i. 350. ii. 119](#)
Lungs, [ii. 319. 330](#)
Lymph, [ii. 304](#)
Lymphatic vessels, [ii. 304](#)

M [Index top](#)

Magnesia, [ii. 44. 66](#)
Magnium, [i. 13](#)
Malic acid, [ii. 74. 197](#)
Malt, [ii. 211](#)
Malleable metals, [i. 14](#)
Manganese, [i. 14. 317](#)
Manna, [ii. 176](#)
Manure, [ii. 247](#)
Marble, [ii. 123](#)
Marine acid, or muriatic acid, [ii. 136](#)
Mastic, [ii. 187. 224](#)
Materials of animals, [ii. 277](#)
—— of vegetables, [ii. 165](#)
Mercury, [i. 14. 346](#)
——, new mode of freezing, [i. 155. 347](#)
Metallic acids, [i. 340](#)
—— oxyds, [i. 316](#)
Metals, [i. 12. 314](#)
Meteoric stones, [i. 342](#)
Mica, [ii. 66](#)
Milk, [ii. 299. 306. 350](#)

Arterial blood, [ii. 305. 326. 338](#)
Asphaltum, [ii. 240](#)
Assafoetida, [ii. 188](#)
Assimilation, [ii. 298](#)
Astringent principle, [ii. 198](#)
Atmosphere, [i. 90. 181. ii. 262](#)
Atmospherical air, [i. 182](#)
Attraction of aggregation, or cohesion, [i. 16. ii. 2](#)
364
—— of composition, [i. 16. ii. 1](#)
Azot, or nitrogen, [i. 182, ii. 100](#)
Azotic gas, [i. 182](#)

B [Index top](#)

Balsams, [ii. 165. 188](#)
Balloons, [i. 245](#)
Bark, [ii. 193. 265](#)
Barytes, [ii. 44. 58. 61](#)
Bases of acids, [i. 263. ii. 69](#)
—— gases, [i. 183](#)
—— salts, [ii. 5](#)
Beer, [ii. 212. 220](#)
Benzoic acid, [ii. 74. 197](#)
Bile, [ii. 308](#)
Birds, [ii. 347](#)
Bismuth, [i. 14](#)
Bitumens, [ii. 239](#)
Black lead, or plumbago, [i. 304](#)
Bleaching, [i. 32. ii. 89. 140.](#)
Blow-pipe, [i. 324. ii. 226](#)
Blood, [ii. 306. 317](#)
Blood-vessels, [ii. 298](#)
Boiling water, [i. 93](#)
Bombic acid, [ii. 75. 290](#)
Bones, [ii. 298, 299](#)
Boracic acid, [i. 365. ii. 131](#)
Boracium, [i. 13. ii. 132](#)
Borat of soda, [ii. 133](#)
Brandy, [ii. 218](#)
Brass, [i. 344](#)
Bread, [ii. 233](#)
Bricks, [ii. 56](#)
Brittle-metals, [i. 14](#)

Minerals, [i. 315. ii. 44. 158](#)
Mineral waters, [i. 296. ii. 129](#)
—— acids, [ii. 73](#)
Miner's lamp, [i. 249](#)
Mixture, [i. 99](#)
Molybdena, [i. 14. 340](#)
Mordant, [ii. 165. 192](#)
Mortar, [ii. 53. 65](#)
Mucilage, [ii. 170](#)
Mucous acid, [ii. 74. 171. 197](#)
—— membrane, [ii. 311](#)
Muriatic acid, or marine acid, [ii. 136](#)
Muriats, [ii. 151](#)
Muriat of ammonia, [ii. 35. 152](#)
—— lime, [i. 100](#)
—— soda, or common salt, [ii. 136. 151](#)
—— potash, [ii. 138](#)
Muriatium, [i. 13](#)
Muscles of animals, [ii. 298. 303](#)
Musk, [ii. 359](#)
Myrrh, [ii. 188](#)

N. [Index top](#)

Naphtha, [i. 357. ii. 240](#)
Negative electricity, [i. 25. 161. 185](#)
Nerves, [ii. 279. 298. 308](#)
Neutral, or compound salts, [i. 333. ii. 4. 22. 69](#)
Nickel, [i. 13. 343](#)
Nitre, or nitrat of potash, or saltpetre, [ii. 32. 104. 116](#)
Nitric acid, [ii. 100](#)
Nitrogen, or azot, [i. 181. ii. 100](#)
—— gas, [i. 182. 211](#)
Nitro-muriatic acid, or aqua regia, [ii. 144](#)
Nitrous acid gas, [ii. 101. 106](#)
—— air, or nitrit oxyd gas, [ii. 107](#)
Nitrats, [ii. 116](#)
Nitrat of copper, [ii. 5](#)
—— ammonia, [ii. 113. 118](#)
—— potash, or nitre, or saltpetre, [ii. 32. 104. 116](#)
—— silver, or lunar caustic, [ii. 19](#)
Nomenclature of acids, [i. 264. ii. 69](#)
—— compound salts, [ii. 4. 22](#)
369

Bronze, [i. 341](#)
Butter, [ii. 351](#)
Butter-milk, [ii. 352](#)

C [Index top](#)

Calcareous earths, [ii. 65](#)
—— stones, [ii. 123](#)
Calcium, [i. 13](#)
Caloric, [i. 12. 33](#)
——, absorption of, [i. 66](#)
——, conductors of, [i. 70](#)
——, combined, [i. 122](#)
——, expansive power of [i. 35](#)
——, equilibrium of, [i. 50](#)
——, reflexion of, [i. 54. 67](#)
——, radiation of, [i. 52. 61](#)
——, solvent power of, [i. 96. 102](#)
——, capacity for, [i. 124](#)
Calorimeter, [i. 156](#)
Calx, [i. 183](#)
Camphor, [ii. 165. 185](#)
Camphoric acid, [ii. 74. 197](#)
Caoutchouc, [ii. 165. 189](#)
Carbonats, [ii. 25. 129](#)
Carbonat of ammonia, [ii. 41](#)
—— lead, [i. 320](#)
—— lime, [ii. 59. 130](#)
—— magnesia, [ii. 67](#)
—— potash, [ii. 25](#)
Carbonated hydrogen gas, [i. 302](#)
Carbon, [i. 282. ii. 329](#)
Carbonic acid, [i. 290. 359. ii. 327](#)
Carburet of iron, [i. 304. 342](#)
Carmine, [ii. 295](#)
Cartilage, [ii. 303](#)
Castor, [ii. 359](#)
Cellular membrane, [ii. 311](#)
Caustics, [i. 349](#)
Chalk, [ii. 62. 123](#)
Charcoal, [i. 282](#)
Cheese, [ii. 356](#)
Chemical attraction, [i. 15. ii. 9](#)
Chemistry, [i. 3](#)
Chest, [ii. 318](#)

—— other binary compounds, [i. 278](#)
Nut-galls, [ii. 98. 199](#)
Nut-oil, [ii. 178](#)
Nutrition, [ii. 297](#)

O [Index top](#)

Ochres, [i. 320](#)
Oils, [i. 285. ii. 306](#)
Oil of amber, [ii. 241](#)
—— vitriol, or sulphuric acid, [ii. 80](#)
Olive oil, [ii. 178](#)
Ores, [i. 315](#)
Organized bodies, [ii. 159](#)
Organs of animals, [ii. 290. 310](#)
—— vegetables, [ii. 159. 265. 271](#)
Osmium, [i. 14. 348](#)
Oxalic acid, [ii. 74. 197](#)
Oxyds, [i. 198](#)
Oxyd of manganese, [i. 117. 317](#)
—— iron, [i. 204. 319](#)
—— lead, [i. 319](#)
—— sulphur, [ii. 91](#)
Oxydation, or oxygenation, [i. 196](#)
Oxygen, [i. 11. 181. 201. 211](#)
—— gas, or vital air, [i. 182. 201](#)
Oxy-muriatic acid, [ii. 140](#)
Oxy-muriats, [ii. 153](#)
Oxy-muriat of potash, [ii. 155](#)

P [Index top](#)

Palladium, [i. 13. 348](#)
Papin's digester, [i. 120. ii. 284](#)
Parenchyma, [ii. 256. 266](#)
Particles, [i. 16](#)
Pearlash, [ii. 24](#)
Peat, [ii. 242](#)
Peculiar juice of plants, [ii. 268](#)
Perfect metals, [i. 14. 324](#)
Perfumes, [i. 308. ii. 183](#)
Perspiration, [ii. 333. 329](#)
Petrification, [ii. 237](#)
Pewter, [i. 344](#)
Pharmacy, [i. 14](#)

China, [ii. 54](#)
Chlorine, [i. 214](#)
Chrome, [i. 14. 340](#)
Chyle, [ii. 305. 317](#)
Chyme, [ii. 316](#)
365
Citric acid, [ii. 74. 197](#)
Circulation of the blood, [ii. 322](#)
Civet, [ii. 359](#)
Clay, [i. 48. ii. 55](#)
Coke, [ii. 241](#)
Coal, [ii. 240. 252](#)
Cobalt, [i. 14](#)
Cochineal, [ii. 295](#)
Cold, [i. 50. 58](#)
—— from evaporation, [i. 102. 113. 150](#)
Colours of metallic oxyds, [i. 319](#)
Columbium, [i. 14. 340. 348](#)
Combined caloric, [i. 122](#)
Combustion, [i. 190](#)
——, volatile products of, [i. 207](#)
——, fixed products of, [i. 207](#)
——, of alcohol, [ii. 225](#)
——, of ammoniacal gas, [ii. 42](#)
——, of boracium, [ii. 133](#)
——, by oxymuriatic acid or chlorine, [ii. 142](#)
——, of carbon, [i. 289](#)
——, of coals, [i. 207. 297](#)
——, of charcoal by nitric acid, [ii. 102](#)
——, of candles, [i. 236. 309. ii. 179](#)
——, of diamonds, [i. 292](#)
——, of ether, [ii. 230](#)
——, of hydrogen, [i. 229.](#)
——, of iron, [i. 200. 322](#)
——, of metals, [i. 321](#)
——, of oils, [i. 208. ii. 178. 309](#)
——, of oil of turpentine by nitrous acid, [ii. 6](#)
——, of phosphorus, [i. 272](#)
——, of sulphur, [i. 261](#)
—— of potassium, [i. 358. ii. 132. 138. 139](#)
Compound bodies, [i. 9. ii. 14](#)
—— or neutral salts [i. 333. ii. 4](#)
Conductors of heat, [i. 71](#)

Phosphat of lime, [ii. 99. 299](#)
Phosphorated hydrogen gas, [i. 277](#)
Phosphorescence, [i. 29](#)
Phosphoric acid, [i. 273. ii. 99](#)
Phosphorous acid, [i. 274. ii. 99](#)
Phosphorus, [i. 270](#)
Phosphoret of lime, [i. 278. 341](#)
—— sulphur, [i. 279. 341](#)
Pitch, [ii. 187](#)
Plaster, [ii. 65](#)
Platina, [i. 14. 323](#)
Plating, [i. 345](#)
Plumbago, or black lead, [i. 304](#)
Plumula, [ii. 257](#)
Porcelain, [ii. 56](#)
Positive electricity, [i. 25. 161. 185](#)
Potassium, [i. 13. 357. ii. 15](#)
Pottery, [ii. 56](#)
Potash, [i. 356. ii. 22](#)
Precipitate, [i. 22](#)
Pressure of the atmosphere, [i. 112. 116](#)
Printer's ink, [ii. 144](#)
Prussiat of iron, or prussian blue, [ii. 291](#)
—— potash, [ii. 291](#)
Prussic acid, [ii. 75. 290](#)
Putrid fermentation, [ii. 235. 360](#)
Pyrites, [i. 341. ii. 97](#)
Pyrometer, [i. 38. 42](#)

Q [Index top](#)

Quick lime, [ii. 59](#)
Quiescent forces, [ii. 12](#)
370

R [Index top](#)

Radiation of caloric, [i. 52](#)
——, Prevost's theory, [i. 52](#)
——, Pictet's explanations, [i. 54](#)
——, Leslie's illustrations, [i. 61](#)
Radicals, [ii. 5. 69](#)
Radicle; or root, [ii. 257](#)
Rain, [i. 104](#)
Rancidity, [ii. 182](#)

—, solids, [i. 73](#)
 —, fluids, [i. 78](#)
 —, Count Rumford's theory, [i. 79](#)
 Constituent parts, [i. 9](#)
 Copper, [i. 14. 331](#)
 Copal, [ii. 187. 224](#)
 Cortical layers, [ii. 265. 267](#)
 Cotyledons, or lobes, [ii. 256](#)
 Cream, [ii. 351](#)
 Cream of tartar, or tartrite of potash, [ii. 200. 222](#)
 Cryophorus, [i. 154](#)
 Crystallisation, [i. 338. ii. 47](#)
 Cucurbit, [i. 258](#)
 Culinary heat, [i. 88](#)
 Curd, [ii. 351. 354](#)
 Cuticle, or epidermis, [ii. 310](#)

D [Index top](#)

Decomposition, [i. 8. 20](#)
 — of atmospherical air, [i. 181. 209](#)
 — of water by the Voltaic battery, [i. 220](#)
 — of salts by the Voltaic battery, [ii. 14](#)
 — of water by metals, [i. 225. 334](#)
 — — by carbon, [i. 301](#)
 — of vegetables, [ii. 202](#)
 — of potash, [i. 356](#)
 — of soda, [i. 56](#)
 — of [ammonia](#), [i. 363. ii. 37](#)
 366
 — of the boracic acid, [ii. 132](#)
 — of the fluoric acid, [ii. 136](#)
 — of the muriatic acid, [ii. 139](#)
 Deflagration, [ii. 118](#)
 Definite proportions, [ii. 13](#)
 Deliquescence, [ii. 95](#)
 Detonation, [i. 219. ii. 116](#)
 Dew, [i. 105](#)
 Diamond, [i. 285](#)
 Diaphragm, [ii. 320](#)
 Digestion, [ii. 316](#)
 Dissolution of metals, [i. 165. 316. 333](#)
 Distillation, [i. 259. ii. 218](#)
 — of red wine, [ii. 218](#)

Rectification, [ii. 223](#)
 Reflexion of caloric, [i. 54. 64](#)
 Reptiles, [ii. 349](#)
 Resins, [ii. 165. 186. 266](#)
 Respiration, [ii. 317. 326](#)
 Reviving of metals, [i. 327](#)
 Rhodium, [i. 14. 348](#)
 Roasting metals, [i. 316](#)
 Rock crystal, [ii. 61](#)
 Ruby, [ii. 53](#)
 Rum, [ii. 219](#)
 Rust, [i. 318. 328](#)

S [Index top](#)

Saccharine fermentation, [ii. 208](#)
 Sal ammoniac, or muriate of ammonia, [ii. 35](#)
 — polychrest, or sulphate of potash, [ii. 91](#)
 — volatile, or carbonate of ammonia, [ii. 41](#)
 Salifiable bases, [ii. 5](#)
 Salifying principles, [ii. 5](#)
 Saltpetre, or nitre, or nitrate of potash, [ii. 32. 104. 116](#)
 Salt, [ii. 91](#)
 Sand, [ii. 30. 51](#)
 Sandstone, [ii. 51](#)
 Sap of plants, [ii. 165. 260. 262. 270. 272](#)
 Sapphire, [ii. 58](#)
 Saturation, [i. 101.](#)
 Sapphire, [ii. 58](#)
 Saturation, [i. 101](#)
 Seas, temperature of, [i. 33.](#)
 Sebacic acid, [ii. 75. 182. 290. 353](#)
 Secretions, [ii. 307](#)
 Seeds of plants, [ii. 210. 271](#)
 Seltzer water, [i. 289. ii. 63. 129](#)
 Senses, [ii. 310](#)
 Silica, or silica, [ii. 30. 51](#)
 Silicon, [i. 13.](#)
 Silk, [ii. 359](#)
 Silver, [i. 321](#)
 Simple bodies, [i. 10. 12](#)
 Size, [ii. 281](#)
 Skin, [ii. 279. 310. 193](#)
 Slaking of lime, [i. 147. ii. 56](#)
 Slate, [ii. 51. 66](#)

Divellent forces, [ii. 12](#)

Division, [i. 7](#)

Drying oils, [ii. 181](#)

Dying, [ii. 191](#)

E [Index top](#)

Earths, [ii. 44](#)

Earthen-ware, [ii. 53. 57](#)

Effervescence, [i. 298](#)

Efflorescence, [ii. 94](#)

Elastic fluids, [i. 37](#)

Electricity, [i. 12. 25. 160. 220. ii. 139](#)

Electric machine, [i. 169](#)

Elective attractions, [ii. 9](#)

Elementary bodies, [i. 8. 12](#)

Elixirs, tinctures, or quintessences, [ii. 225](#)

Enamel, [ii. 57](#)

Epidermis of vegetables, [ii. 269](#)

— of animals, [ii. 310](#)

Epsom salts, [ii. 63. 95](#)

Equilibrium of caloric, [i. 50](#)

Essences, [i. 307. ii. 183. 224](#)

Essential, or volatile oils, [i. 307. ii. 183](#)

Ether, [i. 111. ii. 229](#)

Evaporation, [i. 103](#)

Evergreens, [ii. 274](#)

Eudiometer, [i. 276](#)

Expansion of caloric, [i. 36](#)

Extractive colouring matter, [ii. 165. 190](#)

F [Index top](#)

Falling stones, [i. 319](#)

Fat, [i. 306. ii. 311](#)

Feathers, [ii. 300](#)

Fecula, [ii. 176](#)

Fermentation, [ii. 205](#)

Fibrine, [ii. 277. 289](#)

Fire, [i. 7. 27](#)

Fish, [ii. 346](#)

Fixed air, or carbonic acid, [i. 290. ii. 125](#)

— alkalies, [ii. 20](#)

— oils, [i. 307. ii. 165. 177](#)

— products of combustion, [i. 207](#)

Smelting metals, [i. 316](#)

Smoke [i. 208](#)

Soap, [ii. 24](#)

Soda, [i. 363. ii. 33](#)

— water, [i. 299](#)

Sodium, [i. 13. 363](#)

Soils, [i. 42. ii. 245](#)

Soldering, [i. 345](#)

Solubility, [ii. 92](#)

Solution, [i. 96](#)

— by the air, [i. 102](#)

— of potash, [ii. 28](#)

Specific heat, [i. 126](#)

Spermaceti, [ii. 358](#)

Spirits, [ii. 313](#)

Steam, [i. 140. 182](#)

Steel, [i. 305](#)

Stomach, [ii. 315](#)

Stones, [ii. 46](#)

Stucco, [ii. 65](#)

Strontites, [ii. 44. 68](#)

Strontium, [i. 13](#)

Suberic acid, [ii. 74. 197](#)

Sublimation, [i. 257](#)

Succin, or yellow amber, [ii. 241](#)

Succinic acid, [ii. 74. 197. 241](#)

Sugar, [ii. 165. 174. 208](#)

— of milk, [ii. 355](#)

371

Sulphats, [ii. 5. 91](#)

Super oxygenated sulphuric acid, [ii. 70.](#)

Sulphat of alumine, or alum, [ii. 54. 95](#)

— barytes, [ii. 58](#)

— iron, [ii. 96](#)

— lime, or [gypsum](#), or plaster of Paris, [ii. 95](#)

— magnesia, or Epsom salt, [ii. 67. 95](#)

— potash, or sal polychrest, [ii. 91](#)

— soda, or Glauber's salts, [ii. 92](#)

Sulphur, [i. 256](#)

— flowers of, [i. 257](#)

Sulphurated hydrogen gas, [i. 165. 268](#)

Sulphurets, [i. 341](#)

Sulphurous acid, [i. 254. ii. 88](#)

Flame, [i. 237](#)
Flint, [ii. 30. 51](#)
Flower or blossom, [ii. 271](#)
Fluoric acid, [ii. 54. 134](#)
Fluorium, or Fluorine, [i. 12. ii. 136](#)
Formic acid, [ii. 290](#)
Fossil wood, [ii. 242](#)
[Frankincense](#), [ii. 187](#)
Free or radiant caloric, or heat of temperature, [i. 33](#)
Freezing mixtures, [i. 142](#)
—— by evaporation, [i. 104. 150](#), &c.
Frost, [i. 94](#)
Fruit, [ii. 271](#)
Fuller's earth, [ii. 55](#)
Furnace, [i. 304](#)
367

G [Index top](#)

Galls, [ii. 199](#)
Gallat of iron, [ii. 98](#)
Gallic acid, [ii. 74. 197. 198](#)
Galvanism, [i. 163](#)
Gas, [i. 182](#)
Gas-lights, [i. 240](#)
Gaseous oxyd of carbon, [i. 296](#)
—— nitrogen, [ii. 111](#)
Gastric juice, [ii. 316](#)
Gelatine, or jelly, [ii. 277. 280](#)
Germination, [ii. 256](#)
Gin, [ii. 221](#)
Glands, [ii. 298. 307](#)
Glass, [ii. 30](#)
Glauber's salts, or sulphat of soda, [ii. 92](#)
Glazing, [ii. 57](#)
Glucium, [i. 13](#)
Glue, [ii. 281. 287](#)
Gluten, [ii. 165. 177](#)
Gold, [i. 14. 323](#)
Gum, [ii. 170](#)
—— arabic, [ii. 170](#)
—— elastic, or caoutchouc, [ii. 189](#)
—— resins, [ii. 165. 188](#)
Gunpowder, [ii. 116](#)

Sulphuric acid, [i. 74. ii. 265](#)
Sympathetic ink, [i. 354](#)
Synthesis, [i. 287](#)

T [Index top](#)

Tan, [ii. 192](#)
Tannin, [ii. 165. 192](#)
Tar, [ii. 187](#)
Tartarous acid, [ii. 74. 197](#)
Tartrit of potash, [ii. 222](#)
Teeth, [ii. 300](#)
Tellurium, [i. 14](#)
Temperature, [i. 33](#)
Thaw, [i. 158](#)
Thermometers, [i. 40](#)
——, Fahrenheit's, [i. 42](#)
——, Reaumur's, [i. 42](#)
——, [Centigrade](#), [i. 43](#)
——, air, [i. 44](#)
——, [differential](#), [i. 46](#)
Thunder, [i. 248](#)
Tin, [i. 14. 344](#)
Titanium, [i. 14. 348](#)
Turf, [ii. 242](#)
Turpentine, [ii. 187](#)
Transpiration of plants, [ii. 260](#)
Tungsten, [i. 14. 340](#)

V [Index top](#)

Vapour, [i. 36. 49. 93. 182](#)
Vaporisation, [i. 103](#)
Varnishes, [ii. 187](#)
Vegetables, [ii. 158](#)
Vegetable acid, [i. 310. ii. 74. 197](#)
—— colours, [ii. 190](#)
—— heat, [ii. 272](#)
—— oils, [ii. 177](#)
Veins, [ii. 304. 323](#)
Venous blood, [ii. 305. 326. 338](#)
Ventricles, [ii. 324](#)
Verdigris, [i. 352](#)
Vessels, [ii. 304](#)
Vinegar, [ii. 232](#)

Gypsum, or plaister of Paris, or sulphat of lime, [ii. 95](#)

H [Index top](#)

Hair, [ii. 300](#)

Harrogate water, [i. 268.](#) [341](#)

Hartshorn, [ii. 35.](#) [39.](#) [281.](#) [285](#)

Heart, [ii. 323](#)

—— wood, [ii. 268](#)

Heat, [i. 26.](#) [33](#)

—— of capacity, [i. 127.](#) [135](#)

—— of temperature, [i. 33](#)

Honey, [ii. 175](#)

Horns, [ii. 282.](#) [300](#)

Hydro-carbonat, [i. 241.](#) [303](#)

Hydrogen, [i. 214](#)

—— gas, [i. 215](#)

IJ [Index top](#)

Jasper, [ii. 51](#)

Ice, [i. 138](#)

Jelly, [ii. 281](#)

Jet, [ii. 240](#)

Ignes fatui, [i. 277](#)

Ignition, [i. 119](#)

Imponderable agents, [i. 12](#)

Inflammable air, [i. 215](#)

Ink, [ii. 98.](#) [199](#)

Insects, [ii. 349](#)

Integrand pans, [i. 9](#)

Iridium, [i. 14](#)

Iron, [i. 14.](#) [319.](#) [328](#)

Isinglass, [ii. 194.](#) [285](#)

Ivory black, [ii. 295](#)

Iodine, [i. 214.](#) [ii. 157](#)

K [Index top](#)

Kali, [ii. 34](#)

Koumiss, [ii. 356](#)

Vinous fermentation, [ii. 212](#)

Vital air, or oxygen gas, [i. 182](#)

Vitriol, or sulphat of iron, [ii. 81](#)

Volatile oils, [i. 307.](#) [ii. 165.](#) [183.](#) [224.](#) [269](#)

—— products of combustion, [i. 207](#)

—— alkali, [i. 363.](#) [ii. 20.](#) [35](#)

Voltaic battery, [i. 164.](#) [220.](#) [356.](#) [ii. 15](#)

U [Index top](#)

Uranium, [i. 14](#)

W [Index top](#)

Water, [i. 215.](#) [ii. 262](#)

372

——, decomposition of, by electricity, [i. 200.](#) [225](#)

——, condensation of, [i. 32](#)

—— of the sea, [i. 86](#)

——, boiling, [i. 93](#)

——, solution by, [i. 96](#)

—— of crystallisation, [i. 339](#)

Wax, [i. 309.](#) [ii. 180.](#) [358](#)

Whey, [ii. 351](#)

Wine, [ii. 212](#)

Wood, [ii. 267](#)

Woody fibre, [ii. 156.](#) [196.](#) [267](#)

Wool, [ii. 300](#)

Y [Index top](#)

Yeast, [ii. 234.](#)

Yttria, [ii. 44.](#)

Yttrium, [i. 13.](#)

Z [Index top](#)

Zinc, [ii. 14.](#) [344](#)

[Zirconia](#), [ii. 44](#)

[Zirconium](#), [i. 14.](#)

Zoonic acid, [ii. 75.](#) [220](#)

Transcriber's Notes

Terminology

Many scientific terms used in this book are different from today's standard terminology. The following is not meant as a comprehensive list.

oxy-muriatic acid	chlorine <i>proposed as an element in 1815: see Conversation XIX</i>
"columbium or tantalium"	niobium and tantalum <i>the two elements always occur together, and were not recognized as separate until much later in the 19th century</i>
phosphat of lime	calcium diphosphate or calcium <i>the element calcium was isolated in 1808, but is named only once in this 1817 edition</i>
glucium	beryllium <i>Humphry Davy's name for the element</i>
muriatic acid	hydrochloric acid <i>but still called "muriatic acid" for some commercial uses</i>
muriat of lime	calcium chloride
oxymuriate of potash	potassium chlorate
muriat of soda	sodium chloride (table salt)
carbonic acid	carbon dioxide

Note also:

simple body, fundamental principle	element
fecula	starch (usually spelled "fæcula")
spirit of wine	alcohol
philosopher	scientist
arts	industry, manufacture, crafts etc. (seldom "fine arts")

Some essential concepts relating to living things—photosynthesis, microorganisms, the cell, proteins—are either unknown or not mentioned. The atom theory had been proposed, but not by Humphry Davy; it is not mentioned in this book.

The word "explode" is used at least once in its original, figurative sense ("a word that should be exploded in chemistry") but far more often in its later, concrete one. The word "explosion" is always used concretely ("an explosion, or a *detonation* as chemists commonly call it").

Calculated Values:

"the point of zero, or the absolute privation of heat, must consequently be 1260 degrees below 32 degrees"

-1228° F. The calculation is based on wrong premises; the correct figure is about -460° F or -273° C.

"Mercury congeals only at seventy-two degrees below the freezing point."

-40° F, which is also -40° C. This figure is correct, though approximate.

“The proportion stated by Sir H. Davy, in his Chemical Researches, is as 1 to 2.389.”

[ammonia] “consisted of about one part of hydrogen to four parts of nitrogen.... and from the latest and most accurate experiments, the proportions appear to be, one volume of nitrogen gas to three of hydrogen gas”

These and similar calculations involving relative weight and volume make more sense when one knows the elements' atomic weights. For nitric acid, HNO_3 , the figures are 1:14:48, giving a proportion closer to 1:3.5. For ammonia, NH_3 (not 4), the figures are 14:3.

The first proportion was printed “2,389”. No other decimal numbers occur in the text, but a comma appears once as a thousands separator.

“The *oxalic acid*, distilled from sorrel, is the highest term of vegetable acidification; for, if more oxygen be added to it, it loses its vegetable nature, and is resolved into carbonic acid and water;”

Oxalic acid = $\text{H}_2\text{C}_2\text{O}_4$; carbonic acid (carbon dioxide) = CO_2 . $\text{H}_2\text{C}_2\text{O}_4 + \text{O}$ becomes $\text{H}_2\text{O} + \text{CO}_2 + \text{CO}_2$.

Chapter Numbering

The 3rd and 4th editions used the same Conversation (chapter) numbering. The apparent disappearance of XI and XII is the result of changes between the 4th and 5th (present text) editions:

Volume I: On Simple Bodies

4th edn.	5th edn.
-------------	-------------

I.	I.	
II.	II.	<i>No change</i>
III.	III.	
IV.	IV.	<i>4th</i> : On Specific Heat, Latent Heat, and Chemical Heat. <i>5th</i> : On Combined Caloric, Comprehending Specific Heat and Latent Heat.
	V.	On The Chemical Agencies Of Electricity. <i>Chapter added in 5th edition</i>
V.	VI.	On Oxygen And Nitrogen.
VI.	VII.	On Hydrogen. <i>5th</i> : new sections on Gas lights and Miner's Lamp
VII.	VIII.	On Sulphur And Phosphorus. <i>5th</i> : new section on Decomposition of Sulphur
VIII.	IX.	<i>4th</i> : On Carbone. <i>5th</i> : On Carbon.
IX.	X.	On Metals.

- X. On Alkalies.
- XI. On Earths.
Conversations X, XI were moved to Volume II as XIV, XV.

Volume II: On Compound Bodies

- | | 4th
edn. | 5th
edn. |
|-------|-------------|---|
| XII. | XIII. | On The Attraction Of Composition. |
| | XIV. | On Alkalies. |
| | XV. | On Earths.
<i>Conversations XIV, XV were previously X, XI in Volume I.</i> |
| XIII. | XVI. | <i>4th:</i> On Compound Bodies.
<i>5th:</i> On Acids.
<i>Most of XIII, On Compound Bodies, became XVI, On Acids. Some introductory material was moved to XIV, On Alkalies.</i> |
| XIV. | XVII. | <i>4th:</i> On The Combinations of Oxygen with Sulphur and with Phosphorus; and of the Sulphats And Phosphats.
<i>5th:</i> Of the Sulphuric and Phosphoric Acids: or, The Combinations of |
| XV. | XVIII. | <i>4th:</i> On The Combination of Oxygen With Nitrogen and with Carbone; and of The Nitrats And Carbonats.
<i>5th:</i> Of The Nitric And Carbonic Acids: Or The Combination ... |
| XVI. | XIX. | <i>4th:</i> On Muriatic And Oxygenated Muriatic Acids; and on Muriats.
<i>5th:</i> On The Boracic, Fluoric, Muriatic, and Oxygenated Muriatic Acids; and on Muriats. |
| XVII. | XX. | On The Nature And Composition Of Vegetables. |

Remainder of book: number in 4th edn. + 3 = number in 5th edn.

Plates

Most Plates include the following text, engraved in smaller print:

Drawn by the Author / Engraved by Lowry / Published by Longman & C^o. Oct^r. 2nd.
1809.

This date corresponds to the 3rd edition. Plates V, X and XIII—each containing material new to the 5th edition—read only “Lowry sculp.”

Inconsistencies and variant spellings

None of these lists are meant to be inclusive. They are typical of variations that were not marked as errors.

Standard spellings throughout the book:

bason, judgment, embrio, volcanos (plural), potatoe (singular)

Inconsistencies:

capitalization of “Fig.” or “fig.”

hyphenization of words such as “oxy-muriatic”

“glauber salt” and “Glauber’s salt” both occur

Variant forms:

opake, opaque

aëriform, aeriform

gasses, gases

phosphoret, phosphuret (but always carburet)

Libya, Lybia

dy(e)ing (from “dye”)

nap(h)tha

pla(i)ster

slak(e)ing

earthen-ware, earthen ware

“sulphurous”, “naphtha” are used in the Contents and the Index; “sulphureous”, “naptha” in the body text

forms in “-xion” (such as “connexion”) appear only in the Contents and the Index

Volume I has more archaic forms than Volume II:

“shew”, “inclose” are sometimes used instead of “show”, “enclose”

“carbone” with final “e” appears in one Plate caption. (In the same plate’s header, the “e” appears to have been removed by the engraver.)

“develope(ment)” is more common in Volume I, “develop(ment)” in Volume II

“-ize” and “-yze” forms (for later “-ise” and “-yse”) are common in Volume I, rare in Volume II except in the Index

The “Dr. Marcet” mentioned in a few footnotes and figure captions is the author’s husband. Humphry Davy (“Sir H. Davy”) was knighted in 1812, between the 3rd and 4th editions of the book.

Reminder

DO NOT TRY THIS AT HOME.

*** END OF THE PROJECT GUTENBERG EBOOK CONVERSATIONS ON CHEMISTRY, V. 1-2 ***

Updated editions will replace the previous one—the old editions will be renamed.

Creating the works from print editions not protected by U.S. copyright law means that no one owns a United States copyright in these works, so the Foundation (and you!) can copy and distribute it in the United States without permission and without paying copyright royalties. Special rules, set forth in the General Terms of Use part of this license, apply to copying and distributing Project Gutenberg™ electronic works to protect the PROJECT GUTENBERG™ concept and trademark. Project Gutenberg is a registered trademark, and may not be used if you charge for an eBook, except by following the terms of the trademark license, including paying royalties for use of the Project Gutenberg trademark. If you do not charge anything for copies of this eBook, complying with the trademark license is very easy. You may use this eBook for nearly any purpose such as creation of derivative works, reports, performances and research. Project Gutenberg eBooks may be modified and printed and given away—you may do practically ANYTHING in the United States with eBooks not protected by U.S. copyright law. Redistribution is subject to the trademark license, especially commercial redistribution.

START: FULL LICENSE

THE FULL PROJECT GUTENBERG LICENSE

PLEASE READ THIS BEFORE YOU DISTRIBUTE OR USE THIS WORK

To protect the Project Gutenberg™ mission of promoting the free distribution of electronic works, by using or distributing this work (or any other work associated in any way with the phrase “Project Gutenberg”), you agree to comply with all the terms of the Full Project Gutenberg™ License available with this file or online at www.gutenberg.org/license.

Section 1. General Terms of Use and Redistributing Project Gutenberg™ electronic works

1.A. By reading or using any part of this Project Gutenberg™ electronic work, you indicate that you have read, understand, agree to and accept all the terms of this license and intellectual property (trademark/copyright) agreement. If you do not agree to abide by all the terms of this agreement, you must cease using and return or destroy all copies of Project Gutenberg™ electronic works in your possession. If you paid a fee for obtaining a copy of or access to a Project Gutenberg™ electronic work and you do not agree to be bound by the terms of this agreement, you may obtain a refund from the person or entity to whom you paid the fee as set forth in paragraph 1.E.8.

1.B. “Project Gutenberg” is a registered trademark. It may only be used on or associated in any way with an electronic work by people who agree to be bound by the terms of this agreement. There are a few things that you can do with most Project Gutenberg™ electronic works even without complying with the full terms of this agreement. See paragraph 1.C below. There are a lot of things you can do with Project Gutenberg™ electronic works if you follow the terms of this agreement and help preserve free future access to Project Gutenberg™ electronic works. See paragraph 1.E below.

1.C. The Project Gutenberg Literary Archive Foundation (“the Foundation” or PGLAF), owns a compilation copyright in the collection of Project Gutenberg™ electronic works. Nearly all the individual works in the collection are in the public domain in the United States. If an individual work is unprotected by copyright law in the United States and you are located in the United States, we do not claim a right to prevent you from copying, distributing, performing, displaying or creating derivative works based on the work as long as all references to Project Gutenberg are removed. Of course, we hope that you will support the Project Gutenberg™ mission of promoting free access to electronic works by freely sharing Project Gutenberg™ works in compliance with the terms of this agreement for keeping the Project Gutenberg™ name associated with the work. You can easily comply with the terms of this agreement by keeping this work in the same format with its attached full Project Gutenberg™ License when you share it without charge with others.

1.D. The copyright laws of the place where you are located also govern what you can do with this work. Copyright laws in most countries are in a constant state of change. If you are outside the United States, check the laws of your country in addition to the terms of this agreement before downloading, copying, displaying, performing, distributing or creating derivative works based on this work or any other Project Gutenberg™ work. The Foundation makes no representations concerning the copyright status of any work in any country other than the United States.

1.E. Unless you have removed all references to Project Gutenberg:

1.E.1. The following sentence, with active links to, or other immediate access to, the full Project Gutenberg™ License must appear prominently whenever any copy of a Project Gutenberg™ work (any work on which the phrase “Project Gutenberg” appears, or with which the phrase “Project Gutenberg” is associated) is accessed, displayed, performed, viewed, copied or distributed:

This eBook is for the use of anyone anywhere in the United States and most other parts of the world at no cost and with almost no restrictions whatsoever. You may copy it, give it away or re-use it under the terms of the Project Gutenberg License included with this eBook or online at www.gutenberg.org. If you are not located in the United States, you will have to check the laws of the country where you are located before using this eBook.

1.E.2. If an individual Project Gutenberg™ electronic work is derived from texts not protected by U.S. copyright law (does not contain a notice indicating that it is posted with permission of the copyright holder), the work can be copied and distributed to anyone in the United States without paying any fees or charges. If you are redistributing or providing access to a work with the phrase “Project Gutenberg” associated with or appearing on the work, you must comply either with the requirements of paragraphs 1.E.1 through 1.E.7 or obtain permission for the use of the work and the Project Gutenberg™ trademark as set forth in paragraphs 1.E.8 or 1.E.9.

1.E.3. If an individual Project Gutenberg™ electronic work is posted with the permission of the copyright holder, your use and distribution must comply with both paragraphs 1.E.1 through 1.E.7 and any additional terms imposed by the copyright holder. Additional terms will be linked to the Project Gutenberg™ License for all works posted with the permission of the copyright holder found at the beginning of this work.

1.E.4. Do not unlink or detach or remove the full Project Gutenberg™ License terms from this work, or any files containing a part of this work or any other work associated with Project Gutenberg™.

1.E.5. Do not copy, display, perform, distribute or redistribute this electronic work, or any part of this electronic work, without prominently displaying the sentence set forth in paragraph 1.E.1 with active links or immediate access to the full terms of the Project Gutenberg™ License.

1.E.6. You may convert to and distribute this work in any binary, compressed, marked up, nonproprietary or proprietary form, including any word processing or hypertext form. However, if you provide access to or distribute copies of a Project Gutenberg™ work in a format other than “Plain Vanilla ASCII” or other format used in the official version posted on the official Project Gutenberg™ website (www.gutenberg.org), you must, at no additional cost, fee or expense to the user, provide a copy, a means of exporting a copy, or a means of obtaining a copy upon request, of the work in its original “Plain Vanilla ASCII” or other form. Any alternate format must include the full Project Gutenberg™ License as specified in paragraph 1.E.1.

1.E.7. Do not charge a fee for access to, viewing, displaying, performing, copying or distributing any Project Gutenberg™ works unless you comply with paragraph 1.E.8 or 1.E.9.

1.E.8. You may charge a reasonable fee for copies of or providing access to or distributing Project Gutenberg™ electronic works provided that:

- • You pay a royalty fee of 20% of the gross profits you derive from the use of Project Gutenberg™ works calculated using the method you already use to calculate your applicable taxes. The fee is owed to the owner of the Project Gutenberg™ trademark, but he has agreed to donate royalties under this paragraph to the Project Gutenberg Literary Archive Foundation. Royalty payments must be paid within 60 days following each date on which you prepare (or are legally required to prepare) your periodic tax returns. Royalty payments should be clearly marked as such and sent to the Project Gutenberg Literary Archive Foundation at the address specified in Section 4, “Information about donations to the Project Gutenberg Literary Archive Foundation.”
- • You provide a full refund of any money paid by a user who notifies you in writing (or by e-mail) within 30 days of receipt that s/he does not agree to the terms of the full Project Gutenberg™ License. You must require such a user to return or destroy all copies of the works possessed in a physical medium and discontinue all use of and all access to other copies of Project Gutenberg™ works.
- • You provide, in accordance with paragraph 1.F.3, a full refund of any money paid for a work or a replacement copy, if a defect in the electronic work is discovered and reported to you within 90 days of receipt of the work.
- • You comply with all other terms of this agreement for free distribution of Project Gutenberg™ works.

1.E.9. If you wish to charge a fee or distribute a Project Gutenberg™ electronic work or group of works on different terms than are set forth in this agreement, you must obtain permission in writing from the Project Gutenberg Literary Archive Foundation, the manager of the Project Gutenberg™ trademark. Contact the Foundation as set forth in Section 3 below.

1.F.

1.F.1. Project Gutenberg volunteers and employees expend considerable effort to identify, do copyright research on, transcribe and proofread works not protected by U.S. copyright law in creating the Project Gutenberg™ collection. Despite these efforts, Project Gutenberg™ electronic works, and the medium on which they may be stored, may contain “Defects,” such as, but not limited to, incomplete, inaccurate or corrupt data, transcription errors, a copyright or other intellectual property infringement, a defective or damaged disk or other medium, a computer virus, or computer codes that damage or cannot be read by your equipment.

1.F.2. LIMITED WARRANTY, DISCLAIMER OF DAMAGES - Except for the “Right of Replacement or Refund” described in paragraph 1.F.3, the Project Gutenberg Literary Archive Foundation, the owner of the Project Gutenberg™ trademark, and any other party distributing a Project Gutenberg™ electronic work under this agreement, disclaim all liability to you for damages, costs and expenses, including legal fees. YOU AGREE THAT YOU HAVE NO REMEDIES FOR NEGLIGENCE, STRICT LIABILITY, BREACH OF WARRANTY OR BREACH OF CONTRACT EXCEPT THOSE PROVIDED IN PARAGRAPH 1.F.3. YOU AGREE THAT THE FOUNDATION, THE TRADEMARK OWNER, AND ANY DISTRIBUTOR UNDER THIS AGREEMENT WILL NOT BE LIABLE TO YOU FOR ACTUAL, DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE OR INCIDENTAL DAMAGES EVEN IF YOU GIVE NOTICE OF THE POSSIBILITY OF SUCH DAMAGE.

1.F.3. LIMITED RIGHT OF REPLACEMENT OR REFUND - If you discover a defect in this electronic work within 90 days of receiving it, you can receive a refund of the money (if any) you paid for it by sending a

written explanation to the person you received the work from. If you received the work on a physical medium, you must return the medium with your written explanation. The person or entity that provided you with the defective work may elect to provide a replacement copy in lieu of a refund. If you received the work electronically, the person or entity providing it to you may choose to give you a second opportunity to receive the work electronically in lieu of a refund. If the second copy is also defective, you may demand a refund in writing without further opportunities to fix the problem.

1.F.4. Except for the limited right of replacement or refund set forth in paragraph 1.F.3, this work is provided to you 'AS-IS', WITH NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE.

1.F.5. Some states do not allow disclaimers of certain implied warranties or the exclusion or limitation of certain types of damages. If any disclaimer or limitation set forth in this agreement violates the law of the state applicable to this agreement, the agreement shall be interpreted to make the maximum disclaimer or limitation permitted by the applicable state law. The invalidity or unenforceability of any provision of this agreement shall not void the remaining provisions.

1.F.6. INDEMNITY - You agree to indemnify and hold the Foundation, the trademark owner, any agent or employee of the Foundation, anyone providing copies of Project Gutenberg™ electronic works in accordance with this agreement, and any volunteers associated with the production, promotion and distribution of Project Gutenberg™ electronic works, harmless from all liability, costs and expenses, including legal fees, that arise directly or indirectly from any of the following which you do or cause to occur: (a) distribution of this or any Project Gutenberg™ work, (b) alteration, modification, or additions or deletions to any Project Gutenberg™ work, and (c) any Defect you cause.

Section 2. Information about the Mission of Project Gutenberg™

Project Gutenberg™ is synonymous with the free distribution of electronic works in formats readable by the widest variety of computers including obsolete, old, middle-aged and new computers. It exists because of the efforts of hundreds of volunteers and donations from people in all walks of life.

Volunteers and financial support to provide volunteers with the assistance they need are critical to reaching Project Gutenberg™'s goals and ensuring that the Project Gutenberg™ collection will remain freely available for generations to come. In 2001, the Project Gutenberg Literary Archive Foundation was created to provide a secure and permanent future for Project Gutenberg™ and future generations. To learn more about the Project Gutenberg Literary Archive Foundation and how your efforts and donations can help, see Sections 3 and 4 and the Foundation information page at www.gutenberg.org.

Section 3. Information about the Project Gutenberg Literary Archive Foundation

The Project Gutenberg Literary Archive Foundation is a non-profit 501(c)(3) educational corporation organized under the laws of the state of Mississippi and granted tax exempt status by the Internal Revenue Service. The Foundation's EIN or federal tax identification number is 64-6221541. Contributions to the Project Gutenberg Literary Archive Foundation are tax deductible to the full extent permitted by U.S. federal laws and your state's laws.

The Foundation's business office is located at 809 North 1500 West, Salt Lake City, UT 84116, (801) 596-1887. Email contact links and up to date contact information can be found at the Foundation's website and official page at www.gutenberg.org/contact

Section 4. Information about Donations to the Project Gutenberg Literary Archive Foundation

Project Gutenberg™ depends upon and cannot survive without widespread public support and donations to carry out its mission of increasing the number of public domain and licensed works that can be freely distributed in machine-readable form accessible by the widest array of equipment including outdated equipment. Many small donations (\$1 to \$5,000) are particularly important to maintaining tax exempt status with the IRS.

The Foundation is committed to complying with the laws regulating charities and charitable donations in all 50 states of the United States. Compliance requirements are not uniform and it takes a considerable effort, much paperwork and many fees to meet and keep up with these requirements. We do not solicit donations in locations where we have not received written confirmation of compliance. To SEND DONATIONS or determine the status of compliance for any particular state visit www.gutenberg.org/donate.

While we cannot and do not solicit contributions from states where we have not met the solicitation requirements, we know of no prohibition against accepting unsolicited donations from donors in such states who approach us with offers to donate.

International donations are gratefully accepted, but we cannot make any statements concerning tax treatment of donations received from outside the United States. U.S. laws alone swamp our small staff.

Please check the Project Gutenberg web pages for current donation methods and addresses. Donations are accepted in a number of other ways including checks, online payments and credit card donations. To donate, please visit: www.gutenberg.org/donate

Section 5. General Information About Project Gutenberg™ electronic works

Professor Michael S. Hart was the originator of the Project Gutenberg™ concept of a library of electronic works that could be freely shared with anyone. For forty years, he produced and distributed Project Gutenberg™ eBooks with only a loose network of volunteer support.

Project Gutenberg™ eBooks are often created from several printed editions, all of which are confirmed as not protected by copyright in the U.S. unless a copyright notice is included. Thus, we do not necessarily keep eBooks in compliance with any particular paper edition.

Most people start at our website which has the main PG search facility: www.gutenberg.org.

This website includes information about Project Gutenberg™, including how to make donations to the Project Gutenberg Literary Archive Foundation, how to help produce our new eBooks, and how to subscribe to our email newsletter to hear about new eBooks.