

UNIVERSITY OF THE STATE OF
NEW-YORK.

SPRING COURSE OF LECTURES ON CHEMISTRY,

BY PROFESSOR MAC NEVEN.

THE desire of obtaining some knowledge of Chemistry is now so prevalent among persons of good education in this City, as to call for a Spring-Course of Lectures on the principles of that Science, in order to convenience many, whose health or avocations will not permit them to attend one during the winter.

On this account, and in compliance likewise with a wish which has been expressed to him by several enlightened individuals engaged in the education of youth, the subscriber will, early in April, commence a series of Lectures and experiments on select subjects in Chemistry, and continue them thrice a week, until about the usual time of retiring, for the summer season, to the country.

In its present state of exactness, Chemistry may be used to form the mind to close and accurate reasoning as successfully as mathematics, and far more usefully, as well as agreeably, to the generality of students. Its language and laws are less remote from the business of common life ; every change of bodies by which their properties are altered is Chemical, and yet, if uninformed of the principles of the science, we live, like strangers, among the most familiar, as well as the most interesting phenomena, of the material world.

But Chemistry requires to be studied in a laboratory: that of the College of Physicians in New-York is a model of good arrangement and elegance. Mere verbal explanations, or the bare reading of all the circumstances of a chemical process, would probably ob-

scure it with a prolixity of phrases, that could scarcely cease to be perplexing, but when the subject was learnt by other means.

Experiment, more expeditious, exhibits the fact to our senses, and gives it a locality, by which it is affixed to our memories; then, indeed, explanation and reasoning complete our knowledge.

They, who shall best understand the design every where discernable in the phenomena of nature, will be most impressed with the wisdom and beneficence displayed by the Creator, and unceasingly exerted to promote the improvement and happiness of man.

As a text book greatly facilitates the progress of the student, by giving him a connected view of the Subject he learns, and fixing it in his memory, the conversations on Chemistry are adapted as a text book for the present course. But yet, with such alterations and additions as are demanded by the more improved state of the Science at this time, than when that concise and elegant work was published.

The course will be comprised in 24 Lectures.

A single ticket will be \$10.

A composition will be made with the heads of schools and families.

The lectures will begin on Tuesday the 5th of April, at 5 o'clock in the afternoon, and be continued on Tuesdays, Thursdays, and Saturdays, to the end of the Course.

Apply for tickets No. 69 Beekman street.—To

W. J. Mac Neven.,

New-York, March 12th, 1814.

SIMPLE BODIES.

LECTURE I.

On the powers and properties of matter which are the cause of the phenomena of Chemistry.

OF heat and mixture as chemical Agents. Caloric of temperature—Expansion of Solids—Pyrometer. Expansion of fluids—Thermometer. Expansion of elastic fluids—air-thermometer. Different power of bodies to conduct Caloric. Warm and cold clothing.

LECTURE II.

Continuation of the Subject.

Caloric of fluidity. Caloric of Vaporization. Latent Caloric. Specific Caloric. Sources of Caloric. 1. The Sun emits three species of rays. Fixation of the Calorific-rays 2. Combustion. Phenomena and nature of Combustion. Difference between oxydisation and Combustion. Combustibles contain light. 3. *Percussion*. Produces Condensation. Caloric evolved by Condensation. 4. *Friction*. 5. *Mixture*. Water essential. Depends on latent heat.

LECTURE III.

On Electricity and its relation to Chemical Changes.

Electrics and non electrics. Excitation and the contrary state of the electric fluid. Electrical attraction and repulsion. Electrified points. The Leyden phial. The electric Battery. Density of the electric fluid. Electricity of the atmosphere—Its sources. Consequences of its accumulation. Conductors. Franklinian hypothesis. Positive and negative electricity. Electric polarities.

LECTURE IV.

On Oxygen and Nitrogen.

Chemical constitution of the Atmosphere. Methods of ascertaining the proportions of oxygen and nitrogen in the air. Eudiometry. Oxigation. Oxidation of metals. Oxygen gas obtained from Metallic oxides. Combustion of Iron Wire in oxygen gas. Oxygen essential to Combustion and respiration. Decomposition of the atmosphere by respiration and Combustion. Recomposition of the atmosphere by Vegetation.

LECTURE V.

Physical Constitution of the Atmosphere.

Gravity of the atmosphere—Elasticity—density—absolute quantity—colour of the atmosphere. Height of the Barometer on the Sea shore. Va-

riations. Atmosphere highest at the equator. Rolls towards the coldest Pole. Air accumulates over cold places. Why the Barometer varies little between the Tropics. Temperature of the Atmosphere diminishes with the height of the Air. Why the eastern parts of North America are colder than the opposite coast of Europe. Wind, trade-winds. Monsoons—sea and land breeze.

LECTURE VI.

On Hydrogen.

Levity of Hydrogen. Air balloons. Hydrogen gas essential to the formation of flame. Musical tones produced by the combustion of hydrogen gas in tubes. Combustion of hydrogen and oxygen. Composition of water. Vapour. Other bodies in the air. Contagious matter—how destroyed. Meteoric stones. Their Chemical Analysis. Conjectures respecting their origin.

LECTURE VII.

On Sulphur and Phosphorus.

Properties of Sulphur. Action of heat. Sublimation. Converted by oxygen into an acid. Acidification. Nomenclature of the Acids. Unites with hydrogen. Properties of Sulphurated and Supersulphurated hydrogen gas. Phosphorus. How obtained. Properties of Phosphorus. Unites to oxygen. Phosphorus acid. Phosphoric acid. Unites to hydrogen. Phosphorated hydrogen.

LECTURE VIII.

On Carbon and the Diamond.

Carbon absorbs water, air, and oxygen. Converted by Combustion into Carbonic acid gas. Diamond burnt in oxygen gas. Carburated hydrogen. Gas-lights. Sparkling mineral waters. Effervescence. Fixed and essential Oils. Power of Carbon to destroy fetid odours, to purify water. Prepared Carbon the best dentifrice.

LECTURE IX.

On Metals.

Natural history of Metals. Roasting, Smelting, Assaying of Ores, Oxydation, by the atmosphere. Combustion of metals. Reduction of Metallic oxides by combustibles, by heat alone. Oxydation of metals by acids. Metallic Neutral Salts. Solution. Crystallization. Alloys, Soldering, Plating. Arsenic. Verdigris. Sympathetic Ink.

LECTURE X.

On Alkalis.

Distinctive properties of Alkalis. Alkalis proved to be metallic oxides. Their combination with Acids. Carbonat of Potash. Nitrat of Potash. Composition of Blue Lights, &c. Nomenclature of the Compound Salts. Combination with Oils—Soap. Combination with flint—Glass. Ammonia proved to be a Compound. Ammoniacal gas.

LECTURE XI.

On Earths.

Distinctive properties of Earths. Alkaline Earths. Earths proper. Proved to be Metallic oxides. Nomenclature of the Earths. Lime. Barytes. Silix. Allumine. Pottery. Precious Stones.

OF COMPOUND BODIES.

LECTURE XII.

On the Attraction of Composition.

OF the laws which regulate the attraction of Composition, or chemical affinity. It is confined to bodies of a different nature. Takes place between the most minute particles only—Produces a change of temperature. The properties that characterize bodies in their separate state are destroyed by combination. Those that characterize a compound are destroyed by decomposition. The force of attraction is estimated by that which is required to separate the constituents. Bodies have among themselves different degrees of attraction. Of single and double elective attractions. Of quiescent and divellent forces.

LECTURE XIII.

On the Combinations of Oxygen with Sulphur and with Phosphorus; and of Sulphates and Phosphates.

Of the Sulphuric Acid. How obtained. May be reduced again to Sulphur. Sulphurous Acid gas. Absorbable by water. Destroys vegetable colours. Sulphates. Cold produced by the melting of crystalized Salts. Heat evolved by the crystalization of Salts. Efflorescence Deliquescence. Phosphates.

LECTURE XIV.

On the Combination of Oxygen with Nitrogen and Carbon; and of the Nitrats and Carbonats.

Nitrogen susceptible of various degrees of Acidification. Of the Nitric Acid. How obtained. May be converted into Nitrous Acid. Nitrous Acid gas.—An eudiometrical Test. Gaseous oxyd of Nitrogen, or exhilarating gas. Gun powder. Example of analysis. Deflagration. Nitrates—Of Ammonia—Of Silver. Carbonic Acid constitutes a proportion of the Atmosphere. Sources which keep up a supply of this gas. Its effects on Vegetation. Carbonat of lime.

LECTURE XV.

On the Combination of Oxygen with Carbon and Hydrogen, and the formation of Combustible Acids.

Properties of the Combustible Acids. Constituents. Divisible into four orders. Acetic Acid. Preparation. Properties. Composition. Oxalic Acid. Preparation. Action of simple bodies on it. Composition and uses of Oxalic Acid. Gallic Acid. Action upon metallic Oxides. Ink. Tannin. Natural. Artificial. Combines with Gelatine. Preparation of leather. Chemical uses of the Colorific Acids.

LECTURE XVI.

On the Muriatic and Oxigenated Muriatic Acids, and on Muriats. Of the Fluoric and Boracic Acids. Fluats and Borats.

Muriatic Acid obtained from Muriats. Its gaseous form. Is absorbable by water. Is susceptible of a stronger degree of Oxigenation. Properties of Oxigenated muriatic Acid. Supports combustion. Dissolves Gold. Composition and Nature of Aqua Regia. Oxigenated Muriatic acid destroys Colours. Used for bleaching and for fumigations. Muriat of Soda. Muriat of Ammonia. Oxigenated Muriat of Potash. Detonating powder. Combustion under water.

LECTURE XVII.

On the Nature and Composition of Vegetables.

Of Organized Bodies. Of the Functions of Vegetables. Of the Elements of Vegetables. Of the Materials of Vegetables. Analysis of Vegetables. Of Sap. Mucilage, or Gum. Sugar. Manna and Honey. Gluten. Vegetable Oils. Fixed Oils, Linseed, Nut, and Olive Oils. Volatile Oils, forming Essences and Perfumes. Camphor, Resins and Varnishes. Pitch, Tar, Copal, Mastic, &c. Gum Resins. Myrrh, Assafetida, &c. Caoutchouc, or Gum Elastic.

LECTURE XVIII

On the Decomposition of Vegetables.

Of Fermentation in general. Of the Saccharine Fermentation, the Product of which is Sugar. Of the Vinous Fermentation, the Product of which is Wine. Alcohol, or Spirit of Wine. Analysis of Wine by Distillation. Of Brandy, Rum, Arac, Gin, &c. Tartrit of Potash, or Cream of Tartar. Liqueurs. Chemical Properties of Alcohol. Its Combustion. Of Ether. Of the Acetous Fermentation, the Product of which is Vinegar. Fermentation of Bread. Of the Putrid Fermentation, which reduces Vegetables to their Elements. Spontaneous Succession of these Fermentations. Of Vegetables said to be petrified. Of Bitumens: Naphtha, Asphaltum, Jet, Coal, Succin, or Yellow Amber. Of Fossil Wood, Peat, and Turf.

LECTURE XXIV.

On the Art of Dying.

Of the Colouring principle. Of the preparation of the Colouring principle. Preparation of the Colouring principle by Water. Preparation of the Colouring principle by Alkalis. Preparation of the Colouring principle by Acids. Preparation of the Colouring principle with Oils. Of Mordants. Preparation of Mordants. Preparation of Earthy Mordants. Preparation of Metallic Mordants. Of the Nature of Stuffs. Of the Preparation of Stuffs. Of the Colouring of Stuffs. Of the Mixture of Colours. Of the Art of transposing or changing Colours. Of the Exaltation of Colours.

LECTURE XIX.

History of Vegetation.

Connection between the Vegetable and Animal Kingdoms. Of Manures. Of Agriculture. Inexhaustible Sources of Materials for the Purposes of Agriculture. Of Sowing Seed. Germination of the Seed. Function of the Leaves of Plants. Effects of Light and Air on Vegetation. Effects of Water on Vegetation. Effects of Vegetation on the Atmosphere. Formation of Vegetable Materials by the Organs of Plants. Vegetable Heat. Of the Organs of Plants. Of the Bark, consisting of Epidermis, Parenchyma, and Cortical Layers. Of Albumum or Wood.—Leaves, Flowers, and Seeds. Effects of the Seasons on Vegetation. Vegetation of Evergreens in Winter.

LECTURE XX.

On the Composition of Animals.

Elements of Animals. Of the three principal Materials of Animals, viz. Gelatine, Albumen, Fibrine. Of Animal Acids. Of Animal Colours. Prussian Blue, Carmine, and Ivory Black.

LECTURE XXI.

On the Animal Economy.

Of the principal Animal Organs. Of Bones, Teeth, Horns, Ligaments, and Cartilage. Of the Muscles, constituting the Organs of Motion. Of the Vascular System for the Conveyance of fluids. Of the Glands for the Secretion of Fluids. Of the Nerves, constituting the Organs of Sensation. Of the Cellular Substance which connects the several Organs. Of the Skin.

LECTURE XXII.

On Animalization, Nutrition, and Respiration.

Digestion. Solvent power of Gastric Juice. Formation of Chyle. Its Assimilation, or Conversion into Blood. Of Respiration. Mechanical Process of Respiration. Chemical Process of Respiration. Of the Circulation of the Blood.

LECTURE XXIII.

On Animal Heat : and of various Animal Products.

Of the Analogy of Combustion and Respiration. Animal Heat evolved in the Lungs. Animal Heat evolved in the Circulation. Heat produced by Fever. Perspiration. Heat produced by Exercise. Equal Temperature of Animals at all Seasons. Power of the Animal Body to resist the Effects of Heat. Cold produced by Perspiration. Respiration of Fish, and of Birds. Effects of respiration on Muscular Strength. Of several Animal Products, viz. Milk, Butter, and Cheese; Spermaceti; Ambergris; Wax; Silk; Musk; Civet; Castor. Of the putrid Fermentation.

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SYLLABUS

OF THE

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