bromine, iodine, fluorine, sulphur, silicon, boron, phosphorus, and arsenic.

The allotropic modifications of oxygen, carbon, sulphur, boron, and phosphorus.

The preparation, properties, and composition of water, hydrogen peroxide, the compounds of nitrogen with oxygen and with hydroxyl, ammonia and the ammonic salts, carbon monoxide, carbon dioxide, carbonic acid, the carbonates, light carburetted hydrogen, acetylene, heavy carburetted hydrogen, hydrochloric acid, the oxides and oxyacids of chlorine, bromine, and iodine, hydrobromic, hydriodic, and hydrofluoric acids, the oxides and oxyacids of sulphur, hydrogen sulphide, hydrogen disulphide, carbon disulphide, silica, silicic acid, silicic hydride, boron trioxide, boric acid, phosphuretted hydrogen, the oxides and oxyacids of phosphorus, arseniuretted hydrogen, arsenious and arsenic acids, and the arsenic sulphides.

Manufacture of hydrochloric, nitric and sulphuric acids. Composition and manufacture of bleaching powder. Theory of bleaching. Structure of flame. Suitability of water for domestic purposes. Causes of temporary and of permanent hardness of water. The atmosphere, its constitution; effects of animal and vegetable life upon its constitution. Names and formulæ of some of the more important *silicious minerals.*

The chief properties of the following named metals; their reduction from their ores; and the preparation, properties, and composition of their more important compounds; the monad metals, especially potassium, sodium, and silver; the dyad metals, barium, strontium, calcium, magnesium, zinc, cadmium, mercury, and copper; and gold, aluminium, lead, platinum, nickel, cobalt, iron, manganese, and chromium.

Manufacture of soda-ash, glass, porcelain, and earthen-ware.

HEAT.—General effect of heat upon the volumes of bodies. Experiments illustrative of the expansion of solids by heat. Coefficients of expansion, linear, superficial, and cubical. Illustrations of precautions which changes of volume by heat and cold render necessary in the arts. The gridiron pendulum. Construction and use of the mercurial thermometer. Centigrade and Fahrenheit scales and the conversion of the readings of either into those of the other. Dependence of the boiling point of water upon external pressure and illustrations of this dependence. The temperature at which the maximum density of water occurs, and the effects of this in nature. Change of volume when water passes from the liquid to the solid state and the effects of this in nature. Bursting of *water-pipes in frosty weather.* Other substances which expand on solidification. Experiments illustrating the expansion of gases Principle and action of the fire-balloon. Principles of ventilation. The Sun's action in the generation of winds. Explanation of the Trade Winds. Constancy of the coefficient of expansion of gases. The small deviations from the general rule exhibited by carbonic and sulphurous acid gases, and the chemical and physical character of these gases. The chemical and physical constitution of aqueous vapour and its diffusion through the atmosphere. Meaning of the term *saturated* as applied to air charged with vapour. The effect of expansion in chilling air, and the consequent condensation of the aqueous vapour diffused through the air. Application of this knowledge to the explanation of *clouds and rain. Meaning of* specific heat or capacity for heat. Description and use of the calorimeters of Lavoisier, Laplace, and Bunsen. The facts covered by the term *latent heat.* The latent heat of water and of aqueous vapour expressed in the centigrade and Fahrenheit scales. Conduction and convection, and the distinction between them. The low power of conduction of organic substances. Effect of mechanical texture on the transmission of heat, and the function of the clothes in preserving the body from cold. Character and phenomena of combustion. Chemical actions which occur in the combustion of coal and of ordinary gas. Explanation of the manner in which a candle flame receives its supply of combustible matter. The cause of animal heat. Structure of an ordinary gas flame, and the cause of the difference between this flame