

*Physical Exercise.*—Physiology of muscles. Rational and irrational athletics. Gymnastics, calisthenics, recreations for summer, winter, for boys, girls. The play-ground.

*Mental Exercise.*—Age. Amount and variety of work, of home-work. Change and recreation between tasks. Rest and sleep.

*How to treat injuries from accidents.*—Fainting, suffocation, strangulation, choking, bleeding from nose, wounds, blows on the head, blows on abdomen.

#### IV.—CHEMISTRY.

(30 Lectures.)

Definition of Chemistry and chemical action. Elements and compounds. Indestructibility of matter. Law of definite proportions. Chemical compounds and mechanical mixtures. Constitution of matter. Avogadro's Law and deductions from it. The principles of chemical nomenclature. Formulae and equations.

*Oxygen.*—Its preparation and properties. Oxides, acids, alkalies, bases and hydrates. Allotropic oxygen or ozone.

*Hydrogen.*—Its preparation and properties.

*Nitrogen.*—Its preparation and properties.

*Carbon.*—Its preparation and properties.

Chemical calculations. Calculations of quantities by volume and by weight. Reduction of gaseous volumes to standard pressure and temperature.

*Carbon Dioxide.*—Its preparation and properties. Its decomposition in plants by sunlight. Its production by combustion, respiration, and fermentation.

*Carbon Monoxide.*—Its preparation and properties.

*Nitric Acid.*—Its composition, preparation, properties, uses and tests.

*Compounds of Nitrogen and Oxygen.*—Nitrogen, monoxide, nitrogen dioxide, Dalton's Atomic Theory.

*Ammonia.*—Its preparation by the use of nascent hydrogen and nitrogen. Difference between elements in the free and in the nascent state. Its liberation by the decomposition of organic nitrogenous substances. Its preparation by the action of slaked lime on sal-ammoniac. Its properties. Its importance in agriculture. The significance of its occurrence in certain well-waters.

*Water.*—Its formation, properties and composition. Determination of composition by analysis and by synthesis. Hard and soft water. Causes of permanent and temporary hardness. Modes of softening water for domestic purposes. The significance of the presence of organic matter in water and simple tests for its presence.

*The Atmosphere.*—Its composition by weight and by volume. Constancy of composition. Diffusion of gases. The presence and uses in it of ozone, aqueous vapor, carbon dioxide and ammonia.