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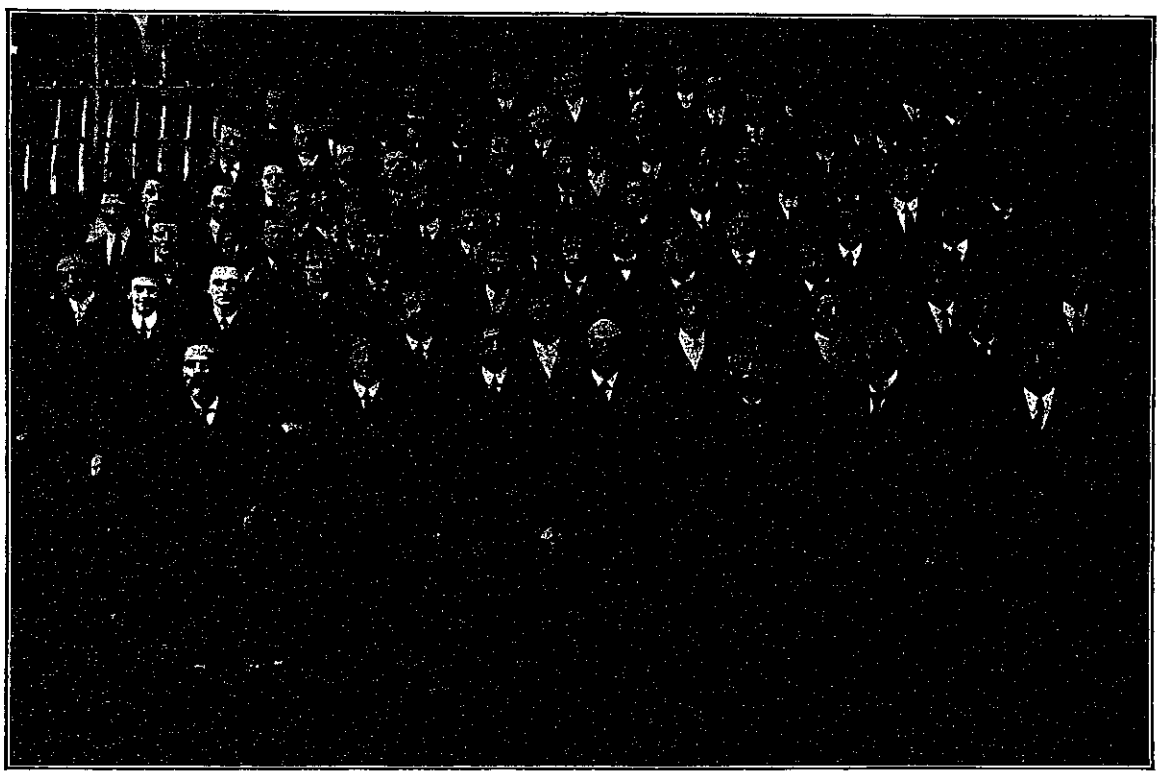

INSTRUCTORS AND MEMBERS OF COURSES V. AND X.

FEW INDUSTRIES NOT FOUNDED ON CHEMISTRY

Manufacturing Processes Advance With Knowledge Of Its Principles

By W. H. WALKER.

The art of tanning, of dyeing, of brewing, and of the other industries which depend for success upon a change in the composition of the material acted upon, preceded by many years the discovery of the principle of science upon which these arts in reality rested. Our forefathers could brew good beer long before they could distinguish a saccharomyces cerevisiae from a bacillus pastorianis; our mothers could dye yarns and color cloth before they were familiar with the diazoamido-quinazolines. To tan leather it is not necessary to know that an animal hide is a colloidal membrane susceptible to changes in osmotic pressure. But so long as these industries depended for their success upon rule of thumb method, failure was common, costs were high, and progress was exceedingly slow. It was only as the chemical principles which underly the processes involved in an industry were determined and appreciated did the product improve in quality, the cost decrease, and the industry grow.

There are relatively few industries upon which we are dependent for the necessities, or indeed comfort of life, that are not founded upon chemical change. But the mechanical appliances or apparatus by which chemical reaction may be carried on, are not infrequently the controlling factors in determining whether a given chemical process will be a commercial or practical success or not. Thus the chemical reactions involved in the Solvay Soda Process were well understood many years before the plant in which the process could be economically carried on was designed and constructed.

Hence the two points of view from which a course in industrial chemistry or, as the subject may more appropri-

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CHEMISTRY ONE OF SIX COURSES FIRST GIVEN AT INSTITUTE

Charles W. Eliot, Afterwards President Of Harvard And F. H. Storer Were First Professors

By HENRY P. TALBOT.

The first catalogue of the Institute for 1865-66, describes six professional courses, of which one is a "Course in Practical Chemistry." The subjects of the first two years of all of these courses were identical, and are of interest both by comparison and contrast with the subjects of the Course in Chemistry as offered at present. They were: Algebra, Plane and Spherical Trigonometry, Solid Geometry, Mechanical and Freehand Drawing, Elementary Mechanics (later called Physics), Chemistry, English Language and Literature and French in the first year, and Coordinate Analytical Geometry, Calculus, Navigation and Nautical Astronomy, Surveying, Descriptive Geometry, Experimental Physics, German, Qualitative Analysis and English in the second year. In the third and fourth years of the Course in Practical Chemistry three groups of studies were offered: Industrial Chemistry, Metallurgy, and General Studies, the last including such subjects as French, German, History, Political Economy, Science of Government, Mental and Moral Philosophy, Logic, Rhetoric, English Literature, Zoology, Physiology, and Botany. Quantitative Analysis and Drawing were included in both of the first two groups and considerable Mineralogy in the first and Geology in the second. Organic Chemistry and additional Physics were soon introduced and these constituted the subjects of the Course with minor modifications for a considerable number of years and, indeed, may be said to be still the foundation of the Courses in Chemistry and Chemical Engineering as they exist today. It is interesting to note that until 1871 graduates were expected to pass a degree examination, which could be oral, written or in the laboratory, on all subjects taken during the entire course. Until 1872 the degree awarded for all courses was "Graduate of the Institute in——," the degree Bachelor of Science having been first used in that year.

In 1865 the Department was numerically small but potentially important. It comprised Charles W. Eliot, who was Professor of General and Industrial Chemistry, and Frank H. Storer, Professor of Analytical Chemistry and Metallurgy, the first now so widely known for his educational work in the presidency of Harvard, to which he went from the Institute in 1869, and the second recognized as an authoritative writer on agricultural chemistry. The methods pursued by these men were also significant, for the Institute was among the first to insist upon the importance of laboratory methods of instruction which, in the terms of the original catalogue, "trains the senses to observe with accuracy, and the judgment to rely with confidence on the proof of actual experiment." The Department occupied five rooms in the basement of the Rogers Building for a number of years, to which other rooms were gradually added until in 1883 the Department was transferred to the present Walker Building. These quarters have, in turn, been outgrown until the Department occupies about forty-five rooms, located in four different buildings and accommodating nearly or quite a thousand students.

The development of the Department may be most concisely stated by noting the men who have mainly contributed to its growth. In 1866 Cyrus M. Warren, the founder of the Warren Funds for Chemical Research, became Professor of Organic Chemistry and remained such until 1871. In 1868 John M. Ordway brought to the Department

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"THEORETICAL" MEANS PRACTICAL CHEMISTRY

Deals With Laws And Principles Rather Than Separate Facts

By A. A. NOYES

The name theoretical chemistry has come to be employed to designate that part of chemistry which deals with the generalizations of the science,—with the laws and principles which have been found to sum up or express a large number of chemical phenomena. The term theoretical is therefor used in the scientific sense, to signify a correlated body of knowledge, and not at all in the colloquial sense, in which theoretical is often contrasted with practical and is made to imply a conclusion reached by mental processes rather than one based on experience. In so far as the progress of the science has enabled the facts of chemistry to be expressed by generalized statements or principles, it is evidently far simpler and more practical to study those principles than to attempt to learn one by one the vast number of isolated facts from which they have been derived. "Theoretical" chemistry is therefore to be considered a most practical part of the education of the technical chemist, especially in view of its great development within recent years in directions that are of direct application in chemical industries.

It will be seen, however, from this statement, that theoretical chemistry is not properly to be regarded as a separate branch of the science. The principles with which it deals are the fundamental ones underlying all branches of chemistry. Accordingly, throughout all the chemical subjects, beginning with the inorganic chemistry of the first year and continuing through the qualitative and quantitative analysis, the organic chemistry, and industrial chemistry of the higher years, much emphasis is laid on

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