In actual practice it will be noticed that at chemists' congresses and conventions nearly everyone reads Cc. as "See-sees." These are some of the results following the original error of adopting such a word as Cubic Centimeter officially. In the Government Tables, Ml is used, but Ml is difficult to pronounce, hence an abbreviation can just as well take in a vowel—the i—, and so we have the first syllable of three letters of the word Milliliter. Now Mil can be used with a period indicating that it is an abbreviation, but it is much better to adopt the word Mil, as it will be called, and do away with the period. This will also permit the use of the plural Mils. If the period is retained, it would be awkward and improper to use the plural as Mil.s.

It has been stated by a few of the critics and those who always oppose changes that it will be somewhat confusing because we have already a word in the English language "Mill" which is a United States coin, which we never see—the tenth of a cent; but when this word was coined, we had also the word "mill," used for a building for grinding substances, for students who get diplomas from certain schools, and even for pugilistic bouts, and other equally interesting words; but we will have no other Mil in the English language which is spelled with one l and there is no likelihood of mistake or error when the word is used either in speaking or in writing.

Now, practically, we have only to remember never to say Cubic Centimeter or use the abbreviation Cc. again. As previously said, the change is only a change of name. It does not involve any calculations or changes in formulas. Cross out Cc. and write Mil. Never again say sonti-meter, say, Mil; but it cannot be expected that this reform will immediately go into effect and it will take a little time for all of us to become accustomed to the change.

THE RELATION OF CHEMICAL CONTROL TO INDUSTRO-CHEMISTRY.*

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Successful industries are, for the greater part, dependent upon the chemical laboratory and chemical control.

The excellent laboratory equipment and staff of such establishments as the General Electric Co., Solvay Process Co., Illinois Steel Co., Pennsylvania Railroad Co., Chicago Packing Houses, Parke, Davis Co., etc., proves the truth of this statement.

The constant growth in efficiency of these manufacturing plants is largely the result of organization, and occupying a most important place in such organization, is the research staff, analytical and general testing laboratories.

True, some plants have no chemist at all, and no testing apparatus. Even in Germany there are many plants chemically uncontrolled, working empirically, by formula.

* Presented at the Eighth Annual Convention of the American Association of Pharmaceutical Chemists held in Rochester, N. Y., May 31st to June 5th, 1915. Delivered as a plea for the formation of a "Scientific Clearing House."

It is not difficult, however, to demonstrate that a chemical laboratory pays and pays well. This point has been learned these many years by all progressive superintendents and managers. The cost of a laboratory (although small) shows conspicuously on the books, while the profits made possible by a laboratory may be lost among other figures unless a special search is made for them. Under these circumstances men of little insight will continue to operate their plants without proper scientific control, until by the competition of better managed plants they are forced to adopt modern methods or go out of business.

The successful establishments, as has already been cited, are fully aware of the necessity of chemical control, this being evidenced by their well regulated scientific departments.

When it is realized that these departments should investigate all new processes, constantly improve the existing ones; correct and explain irregularities of manufacturing operations; invent new processes; that they should determine the valuation and exact composition of all raw materials and finished products, the fixing of yields, the necessary control of different stages of many processes, etc., it becomes clear that if these constructive forces are to be used to the fullest it must be through the creation of an organization that will automatically cause every department in that organization to coöperate with the research and analytical branches.

The duties of a research department may be summarized as follows:

Investigating cheaper raw materials, new products, increased yield, new uses for products manufactured, greater purity of products manufactured, utilization of wastes, more efficient structural material, reduction of cost of production, apparatus, etc.

The department should be equipped with research laboratories where work can be carried on from a test-tube scale to manufacturing in a large enough way to test practical difficulties and costs.

The analytical department should control all work relating to sampling and analysis, and its duties may be given generally as follows:

The analysis and sampling of all raw materials and finished products, as well as the analyses necessary in the intermediate steps of some processes in order to insure proper control. It should furnish figures used to calculate yields, and perform all the analytical work in connection with investigations, which often involves the necessity of inventing new methods or investigating and adopting better methods. It should do all analytical work that will aid the manufacturing, sales, purchasing and construction departments, and coöperate with the sales department in investigating complaints.

These, briefly, are the duties of the modern scientific department.

We will now consider the result of this chemical control.

As you have already seen, the chemist or chemical engineer maintains a place in almost every industry and phase of life. He has reduced the cost of living by discovering cheaper edibles and the production of other products from the waste material of former times, such as oleomargarine from packing house material, oils from cotton seeds, glycerin and soap from waste fats, etc.

In mining he has classified the minerals, enabling by simple tests to ascertain the value of each. He has discovered and invented means of reducing the death rate in coal mining by the use of fire damp indicators, rescue outfits, Davey Safety Lamps, and the regulation of explosives.

He has utilized waste coal by converting it into tar, coke, fuel and illuminating gases, ammoniacal liquor, fertilizers, and many colors used in the dyeing industry.

From the coal gas industry we obtain as by-products, coke, gas, carbon, tar, ammoniacal liquor, and spent purifying material.

In gas manufacture we have as subsidiary products, dyes, sweetening principles, and photographic developers from coal tar, while water-gas yields light oils of the benzole series, creosoting oils, naphthalene oils, road compounds and pitches.

From wood he has made paper pulp, ethyl alcohol, methyl alcohol, rosin, tars, potash and many other products. Waste pine wood, stumps, etc., are now converted into turpentine and other by-products, thus saving the valuable timber for lumber.

In the iron industry the flue dust (about 3% of total ore charged) is collected, heated in the oxidizing atmosphere of a portland cement rotary kiln, and is then recovered in nodular forms, carrying over 60% of iron. This alone represents a saving of 1,250,000 tons of iron ore per year.

Slag, which was formerly a waste product is now converted into slag cement which differs very little in chemical analysis, color, specific gravity, fineness or in usefulness from that made by ordinary methods. The potash industry has been controlled by the German Potash Syndicate for many years, but the possible production of potash on a commercial scale, from the kelp of the Pacific coast may yet cause the Germans some uneasiness.

Nitrogen is recovered from coal by the by-product coke ovens and in Germany it is being abstracted from the atmosphere.

During the past quarter of a century chemists have been developing new uses for new materials very rapidly.

A few years ago chromium had little use and metallic manganese was a curiosity but today these metals are used by the ton as pure metals in alloys for electrical resistance, replacing great quantities of German silver and other expensive alloys. Tantalum and Columbium ores were merely an interest in museums, but today they are being worked for the Tantalum (used as a filament for incandescent electric lights and as a substitute for platinum) and undoubtedly the Niobium will soon be utilized.

In sanitation he has done much to reduce contagion, etc., through the application of the pure food laws and the regulation of public water supply and sewage disposal.

Alcohol, formerly produced from corn, can now be produced from saw-dust, the by-products of sugar works and waste sulphite lyes.

Formerly, kerosene was the chief product sought in petroleum and the lighter and heavier fractions were allowed to go to waste. It is now converted into gas, gasoline, naphtha, kerosene, lubricating oils, asphaltic road material and carbon for electrical purposes. The recent discoveries of Dr. Rittman in the petroleum industry may eventually give the United States a supremacy in the dye-stuffs industry that has so long belonged to Germany, while the increased yield of gasoline may prove an important factor in paying the costs of the process.

In no phase of chemical industry, however, does chemical control play a more important part than in the manufacture of medicine. The doctor must rely upon the chemist to give him reliable and efficient medicinal products. Thus, both drug and finished product must be assayed, tested and standardized so as to insure the physician with a reliable remedy. When it is considered that many drugs are emergency remedies, the life of a patient often depending upon their activity, it is not difficult to understand why the chemistry of medicine is one of the most important branches. But, chemistry, even at its present best, is incapable of assaying the active principle of every drug, as there exists in certain drugs superactive principles of so delicate a composition that they break down under analysis.

At this point we must determine, not "how much of you is present?" but "how much can you do?" Here must the analyst bow to the pharmacologist and depend upon him to ascertain and determine the physiological activity of such drugs as are not amenable to chemical assay. In this way drugs are compared and adjusted to certain definite and uniform standards, thereby making it possible for the physician to determine in advance the actual effect of a given quantity.

Besides the standardization of products, the chemical laboratory is constantly adding new and valuable remedies to the realm of materia medica and therapeutics.

Today we are in the very midst of the unfolding of the secrets of immunity and prophylaxis. In fact, we are almost impatient if each succeeding number of our scientific journals does not inform us of some new discovery or means of attack against the common enemy—disease.

Probably more has been achieved within the past quarter of a century than in the whole history of medicine. Certain diseases have almost been eliminated and plague and pestilence no longer terrify; for we have the confidence that their causes, even though still unknown in some cases, are material and conquerable, and that their incidences and ravages may be prevented by measures already known or surely to be discovered.

The recent discoveries in chemistry are so all-important and even revolutionary and its position as a science is so comprehensive that one scarcely dare make any statement or prediction concerning it.

The United States, which until recently has lagged behind some other nations in chemical research, is beginning to atone for past indifference. During the past few years the number of students pursuing courses in chemistry at our various colleges has steadily increased. Despite this fact this shows a comparatively small increase in view of the enormous increase in the industrial operations of the country, constantly demanding trained men.

No small part of Germany's industrial progress has been due to the discoveries of her men of science. It may be that Germany has lent more encouragement to scientific research, but there are signs that her supremacy may be challenged as our young men appreciate the advantages to be derived from the pursuit of what has been termed the most practical of sciences.

These results accomplished by the chemical laboratory and chemical control are little short of wonderful. It has been the work of the chemist, physicist, metallurgist, and engineer, all applying the broad principles of chemistry to industry that has made such important and far-reaching development.

Waste has, in some industries, been reduced to a minimum and their efficiency is great indeed, yet in no single case has perfection been reached.

R. J. STRASENBURGH Co., Rochester, N. Y.

DRUGS AND THE MAN.*

DR. ARTHUR E. BOSTWICK, LIBRARIAN, ST. LOUIS PUBLIC LIBRARY.

The graduation of a class of technically trained persons is an event of special moment. When we send forth graduates from our schools and colleges devoted to general education, while the thought of failure may be disquieting or embarrassing, we know that no special danger can result, except to the man who has failed. The college graduate who has neglected his opportunities has thrown away a chance, but he is no menace to his fellows. Affairs take on a different complexion in the technical or professional school. The poorly trained engineer, physician or lawyer, is an injury to the community. Failure to train an engineer may involve the future failure of a structure, with the loss of many lives. Failure to train a doctor means that we turn loose on the public one who will kill oftener than he will cure. Failure to train a lawyer means wills that can be broken, contracts that will not hold, needless litigation.

Congressman Kent, of California, has coined a satisfactory word for this sort of thing—he calls it "mal-employment." Unemployment is a bad thing. We have seen plenty of it here during the past winter. But Kent says, and he is right, that malemployment is a worse thing. All these poor engineers and doctors and lawyers are busily engaged, and every thing on the surface seems to be going on well. But as a matter of fact, the world would be better off if each one of them should stop working and never do another stroke. It would pay the community to support them in idleness.

I have always considered pharmacy to be one of the occupations in which malemployment is particularly objectionable. If you read Homer badly it affects no one but yourself. If you think Vera Cruz is in Italy and that the Amazon River runs into the Arctic Ocean, your neighbor is as well off as before; but if you are under the impression that strychnine is aspirin, you have failed in a way that is more than personal.

I am dwelling on these unpleasant possibilities partly for the reason that the Egyptians displayed a skeleton at their banquets—because warnings are a tonic to the soul—but also because, if we are to credit much that we see in general literature, including especially the daily paper and the popular magazine, *all* druggists are malemployed. And if it would really be better for the community that you should not enter upon the profession for which you have been trained, now, of course, is the time for you to know it.

* A valedictory address delivered at the commencement exercises of the St. Louis College of Pharmacy, May 19, 1915, wherein a layman presents his views anent influences affecting pharmacy.