

work in developing the spirit of helpfulness and fellowship among their members. Altogether too few of the members of the Society, however, attend the general meetings which occur semi-annually. It is true that attendance at these meetings is rapidly increasing, but it has not yet reached the point that can reasonably be expected, and it is hoped that the members of the Society will carefully consider this point and make every endeavor to be present at Indianapolis and future gatherings of the general Society.

No member who has not been a regular attendant at the general meetings can realize the wonderful help they may be in the development of the individual. They give opportunity of meeting chemists in all kinds of work, thereby broadening the knowledge of the individual; they give opportunity of meeting chemists who are interested in the same lines of work and thereby frequently add to the specific facts which are important in special industries; they give opportunity of meeting the most successful chemists both in industrial and educational work and thereby add inspiration—they give opportunity for visiting special industrial works, adding to the practical knowledge of the visitor; they give opportunity for a summer or winter outing, for every Local Section does much to entertain its guests.

Many chemists feel that they cannot afford the time and expense of attending these meetings. Most of those who do attend, especially after they have been two or three times so that they become acquainted, realize that they cannot afford to stay away even if the distance is great and time is pressing. Especially the young or isolated chemist who has not the opportunity of frequent intercourse with his fellows, who is too apt to get into one line of thought, cannot afford to stay away, for the friendships made and the inspiration gained through knowledge of the work of others will make him a better chemist and is certain in the end to add to his material as well as to his mental advancement.

It is particularly pleasant to see the changing attitude of many of our most prominent firms towards attendance at the general meetings of the Society. A few years ago chemists complained that they found it difficult even to get the necessary leave of absence to attend the meeting. Now the case is quite often reversed. Firms have found that they gain so much by the presence of their chemists at these meetings that those who have had experience have almost invariably not only allowed the necessary time for attendance but in many instances now insist upon attendance and in an increasing number of cases pay all the expenses of the chosen individual. These cases are as yet altogether too few, but they are yearly increasing and it is indicative of a broader and more successful American chemical industry. It is certainly true that it is the most progressive and successful firms that require their chemists as a part of their work to attend the general meetings of the American Chemical Society.

Special efforts are being made to have the summer meeting in Indianapolis a great success, and definite

assurance can now be given that every member who attends the meeting will have unusual opportunity both for enjoyment and for professional development. The Entertainment Committee is planning an interesting program for the entertainment of ladies, and it is certain that they, too, will find the meeting unusually attractive. An especially amusing program is promised for the smoker on one evening; the following evening an automobile ride to the Country Club with lunch on the grounds, lawn fete, dancing, music, etc., is expected; on the third evening the usual banquet will be held. Two full days will probably be given up to the meetings of the Divisions, while the morning of the first day will be given to general addresses of interest to all chemists. One afternoon those present are to be especially entertained at the dedication of the new laboratories of the Eli Lilly Company, one of the largest pharmaceutical manufacturing companies in America. Saturday will probably be given up for the main part to visits to manufacturing plants.

Begin to plan now for the summer meeting. Remember the date is Wednesday, June 28th, to Saturday, July 1st; the place, Indianapolis. Let us all "get together" there!

CHARLES L. PARSONS.

ENDOWMENT FUND.

No organization which does a great and broad public service should be without the resource of available funds to promote and further the work.

On every hand we see a continual and worthy effort being made to stabilize and make sure of a continuous performance such endeavor.

Why the American Chemical Society should not take advantage of the very apparent opportunity is hardly understandable. Here awaiting us for action are to be found the ideal conditions under which a most successful effort can be undertaken. An organization composed of a body of men representing all classes, working for a great common good, namely, the advancement of chemical knowledge, with the best field for its application.

With an intangible valuable attribute to the goods to be delivered—working brains; a market for these same goods, which is boundless; an unsatisfied demand for the best obtainable execution measured by the ability of the individual and the effectiveness made possible by the organization as a unit, what more could be asked or could be offered which would appeal to the users and consumers of such a product, namely, the body corporate, The American Chemical Society? We who are of it should individually and all together determine upon a course which will enable the Industrials of this country to benefit by an open-minded, free-for-all research in all branches of chemistry, giving to the struggling young chemist inspiration by opportunity, and to the manufacturers at large an appreciation of unrestricted research, the benefit of which can be enjoyed by all to the great advancement of the industries of this country.

That an endowment fund would properly take care of this need is very apparent, and in one way only

can such a fund be made available—absolute and complete cooperation with a well defined plan of action carefully thought out and made the interest of every director, councilman, division chairman, sectional chairman and member.

In order to secure the opinion of the Society as a whole we take this opportunity to place an insert in this issue, and request your prompt reply to the questions of the Chairman of the Endowment Committee.

B. T. B. HYDE.

ORIGINAL PAPERS.

THE MICROSCOPIC EXAMINATION AND IDENTIFICATION OF CARBON.

By G. A. ROUSH.

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The remarkable success which has in the last few years attended the application of microscopic methods to the examination of the structure and properties of metals and alloys suggested an attempt to apply the principles of metallography in the examination of carbon. The carbons of commerce are made up of small particles of one or more of the different varieties of amorphous carbon cemented together by means of a binder, usually tar or pitch. The object of this investigation was, if possible, to develop some distinguishable difference in the appearance under the microscope of these ultimate particles of carbon, by which they could always be recognized, in order that the composition of unknown materials might thus be determined.

The wide-spread uses to which carbon is being put nowadays, and the variety of raw materials which may enter into the composition of carbons of different classes and grades has made desirable a method for the differentiation of various raw materials which may have been used, and an approximate analysis of the composition of any particular sample. The principal commercial uses of carbon are for arc light electrodes of various kinds, electrodes in furnace and electrolytic processes, electrodes for dry and wet batteries, brushes for dynamos and motors, contacts and resistance material in electrical apparatus and machinery.

Such a wide scope of uses as are shown here necessarily implies a considerable number of available raw materials which may be used to give the carbons the distinctive properties best suited for their particular uses. The list of available materials includes the following:

Lampblack
Retort Carbon
Petroleum Coke

Graphite	{ Natural	{ Powdered
	{ Artificial	{ Flake
Coal Coke	{ Bituminous	{ Bee Hive
		{ By product
	{ Anthracite	{ Gas

Coal coke is at present used very little, if any, on account of its high ash content, but it is a possible available material for future use, provided some process can be devised to remove the ash, or for some use where the presence of the ash is not detrimental. Lampblack is used most in the high-grade arc carbons, and to a small extent in some grades of motor and dynamo brushes. Electrodes are mainly of petroleum coke, sometimes of retort

carbon and sometimes of a mixture of these two. Motor and dynamo brushes may be composed wholly of retort carbon, petroleum coke or one of the varieties of graphite, or of mixtures of two or more of these materials, with occasionally a small percentage of lampblack, as stated above.

Heretofore there has been no means of even approximately estimating the composition of products of this kind, except by judging from appearance, and comparing with trial mixtures. Hence the determination of the composition, or the duplication, of a sample of unknown composition was a matter of considerable difficulty, which, it is hoped, will be somewhat lessened by the results of this investigation. The results here described are not as full and complete as might be desired, but those obtained are given as a step in the right direction, with the hope of adding to them in the future.

Methods.—The methods are simply those used in the examination of a sample of a metal or alloy to determine its internal structure. These can be found in full in any standard work on metallography, and so will be given only briefly here. The method in general consists in selecting a suitable sample of the material in question, grinding on one side a flat surface by means of an emery wheel, and then bringing this flat surface to a smooth polish by rubbing it successively on emery papers of increasing fineness. After a perfectly smooth polished surface is obtained, the structure of the material is developed by etching the surface by means of some suitable etching medium, and the prepared surface is then ready for examination under the microscope, the object being, as stated before, to develop some distinguishable difference in the appearance of the particles of which the material is composed, by which they can be recognized and distinguished.

Preparation of the Samples.—The samples should be selected so as to be as representative as possible, and several different sections should be prepared so that the results obtained may represent a fair average of the material in question. In order to accomplish this, the samples examined should include sections, the polished surfaces of which were originally perpendicular to each of the three principal axes of the original sample, since the orientation of the particles of carbon varies with the shape of the particle and with the shape of the die through which they are forced.¹ The samples to be examined are best removed from the entire mass by means of a hack saw. The surface to be prepared is first flattened by touching to an emery wheel or dressing with medium rough file. The further polish-

¹ Those not familiar with the manufacture of carbon are referred to the writer's article on this subject in *THIS JOURNAL*, May, 1909.