

have practically the same specific electrical resistance and the same surface conductivity.

If we add that all the infusible materials made from phenol (hydroxybenzol) and formaldehyde and ammonia, or hexamethyltetramin, dry or wet, have the same specific gravity, the same color, the same appearance, the same resistivity to solvents and chemicals, and that up till now, no property has been mentioned which is not common to all these products, it becomes easy to draw conclusions as to their absolute identity.

YONKERS, NEW YORK  
January 10, 1914

L. H. BAEKELAND

### OZONE

*Editor of the Journal of Industrial and Engineering Chemistry:*

Referring to the editorial, on the above subject (This JOURNAL, 5, 882), commenting on tests of ozone published recently in the *Journal of the American Medical Association*, I wish to call to your attention that the manner in which these tests were conducted, leaves large room for doubt as to the reliability of the conclusions drawn by the authors and that the readers of your valuable paper should be warned against accepting them without more convincing proof.

After a careful study of the reports, I am impressed that many of the conclusions are imaginary and not proven by the results obtained. For example, tests were made on three men by placing them individually in front of a large ozone generator delivering a strong blast of ozonized air at high concentration, the face of the victim being only a few inches from the outlet of the ozone generator. One of the victims had a "sore throat" ("cold") at the beginning of the experiments. The experimenters concluded from the results of the test that breathing ozone in strong concentrations produces sore throat. When we consider the probable effect of the blast of air on the face and head, the wind pressure on the nasal passages and the dust carried by the blast, it seems rather far-fetched to make any definite conclusions regarding the effect of ozone, especially from such a small number of tests and subjects. Furthermore, the conditions of the tests were extremely abnormal as it has not been proposed to use in ventilation concentrations exceeding one-tenth of that used in these tests.

The results of the bactericidal tests indicate that ozone in dry air has little germicidal effect. There is, however, overwhelming evidence which proves beyond a doubt that it will destroy germs in water. This has been thoroughly tested out by the best scientific authorities in Europe in connection with the many municipal ozone water purification plants, as well as by Pasteur's Institute and the German Imperial Board of Health. The latter were able to destroy by means of ozone practically all germs in water containing as many as 30,000 cholera and 30,000 typhus bacteria per cubic centimeter. As there is always considerable moisture in the respiratory passages, it is perfectly logical to suppose that the breathing of ozonized air may have some beneficial effect.

The fact that the guinea pigs died in an atmosphere of strongly concentrated ozone is not surprising, as there is no substance known to science which will destroy bacteria without also destroying animal tissue. For this reason, antiseptics cannot be used full strength and the best that is expected from their use is to stunt the growth and prevent the propagation of the bacteria.

The tests on the animals in the cages supplied with mild concentrations of ozone showed practically neutral results, *i. e.*, there was no pronounced beneficial or detrimental effects noted. The duration of the tests was entirely too short to be conclusive.

The test these experimenters made of blowing ozonized air on a piece of paper covered with lampblack to determine the

effect of ozone on tobacco smoke, was going a long way around. It seems to me the proper way to make such a test would be to make it on tobacco smoke instead of lampblack. Particles of carbon in lampblack are very many times larger than the floating particles of tobacco smoke and hence, the oxidation of the latter in its very finely divided state might take place when lampblack would not be appreciably affected.

W. H. THOMPSON

WESTINGHOUSE ELECTRIC & MFG. CO.  
EAST PITTSBURGH, PA.  
December 16, 1913

### RAPID DETERMINATION OF COPPER IN STEEL, CAST IRON AND ALLOY STEELS

*Editor of the Journal of Industrial and Engineering Chemistry:*

The steadily increasing use of copper in steel in the last year or so has created a demand for a more rapid determination of that element in steel than is possible by the present method of analysis.

Copper in steel is usually determined by being precipitated as copper sulfide by the means of hydrogen sulfide or sodium hyposulfite. The copper sulfide is then generally incinerated in a porcelain crucible, digested at a gentle heat with nitric acid, transferred to a platinum crucible and evaporated with hydrofluoric and sulfuric acids to remove silica.

The residue, if not soluble in sulfuric acid, is fused at a low heat with sodium or potassium pyrosulfate. The copper is then deposited electrolytically from the acid solution, or determined colorimetrically in an ammoniacal solution.

In the presence of titanium and molybdenum there are variations of this method which make it even more tedious and time-consuming. There is nothing new or original claimed for the method about to be described as it follows very closely Low's method for the precipitation of copper by aluminum, but so far as the writer is aware, it has never been used for the determination of copper in steels or irons.

#### METHOD

From three to five grams of steel, depending upon the amount of copper present, are dissolved in a mixture of 60 cc. of water and 7 cc. of sulfuric acid (sp. gr. 1.84) in a 250 cc. beaker. After all action has ceased, place in the beaker a piece of sheet aluminum prepared as follows: Cut a stout piece of sheet aluminum 1½ inch square and bend the corners so that it will stand upon its edge in the beaker.

Boil the solution from twenty to twenty-five minutes which will be sufficient to precipitate any amount of copper liable to be present. Remove from the heat and wash the cover and sides of the beaker with cold water. Decant the liquid through a S & S 11 cm. filter. Wash the precipitate three times with cold water, then place the filter in a 100 cc. beaker. Pour over the aluminum in the beaker 8 cc. of nitric acid (sp. gr. 1.42) and 15 cc. of water and heat to boiling. Pour this over the filter in the 100 cc. beaker and boil until the paper is a fine pulp, which requires only a few minutes. Remove from the hot plate and filter, wash with water, receiving the filtrate in an electrolytic beaker, add 2 cc. of sulfuric acid (sp. gr. 1.84) and electrolyze, using 2 amperes and 2 volts. Gauze cathodes and anodes are used and the deposition is completed in from one to one and a quarter hours. The total time of the determination from the weighing of the sample to the weighing of the copper is about three hours, and with the proper equipment, a large number of samples may be run at the same time.

Below are some of the results obtained on the Bureau of Standards' samples.

Name	Average copper present Per cent	Copper found Per cent
Vanadium steel No. 24.....	0.022	0.020
Chrome nickel steel No. 32.....	0.056	0.056
Chrome vanadium steel No. 30.....	0.070	0.066
Nickel steel No. 33.....	0.150	0.150
No. 5 A iron (C).....	0.060	0.063

As a further proof of the accuracy of this method, known amounts of pure electrolytic copper containing 99.88 per cent of copper were added to the Bureau of Standards' sample No. 14 A steel. The mixed drillings were dissolved in 20 cc. of (2-1) nitric acid, 8 cc. of sulfuric acid (sp. gr. 1.84) added and the solution evaporated until sulfuric acid fumes were evolved freely. The solution was allowed to cool and then 25 cc. of cold water were added and the solution was heated until all the sulfate was dissolved. The solution was filtered and the filter washed with hot water. The volume (not to exceed 75 cc.) was brought to a boil and the sheet aluminum introduced. Procedure was the same as stated before, except that after the solution was decanted through the filter and washed with water, the copper was dissolved on the filter and the filtrate received in an electrolytic beaker and electrolyzed as usual. The results obtained follow:

Copper added Per cent	Copper found Per cent
0.499	0.49
0.998	0.99
1.997	1.97
2.996	3.00
3.995	3.99
4.994	4.98

I wish to give credit to Mr. George Shuster of the laboratory force, who tried out this method and obtained the results stated above.

WILLIAM B. PRICE

WATERBURY, CONN.  
Oct. 25, 1913

#### INTERNATIONAL ELECTRICAL CONGRESS, 1915.

The International *Electrical* Congress is to be held at San Francisco, September 13-18, 1915, under the auspices of the American Institute of Electrical Engineers, by authority of the International Electrotechnical Commission and during the Panama-Pacific International Exposition. Dr. C. P. Steinmetz has accepted the Honorary Presidency of the Congress. The deliberations of the Congress will be divided among twelve sections which will deal exclusively with electricity and electrical practice. There will probably be about 250 papers. The first membership invitations will be issued in February or March, 1914.

Attention is drawn to the distinction between this *Electrical* Congress and the International *Engineering* Congress which will be held at San Francisco during the week immediately following the electrical congress. The engineering congress is supported by the Societies of Civil, Mechanical and Marine Engineers and by the Institutes of Mining and Electrical Engineers, as well as by prominent Pacific Coast engineers who are actively engaged in organizing it. This Congress will deal with engineering in a general sense, electrical engineering subjects being limited to one of the eleven sections which will include about twelve papers, treating more particularly applications of electricity in engineering work.

The meeting of the International Electrotechnical Commission will be held during the week preceding that of the Electrical Congress.

#### SPRING MEETING OF THE AMERICAN CHEMICAL SOCIETY

The Forty-ninth General Meeting of the American Chemical Society will be held in Cincinnati, Ohio, April 8-11, 1914.

The officers of the local section are: President, F. W. Weissmann, 2900 Vine St., Cincinnati, Ohio, and Secretary, Stephan J. Hauser, 1623 Maple Avenue, College Hill, Cincinnati, Ohio. A more complete statement of the meeting will appear in the March issue of THIS JOURNAL. The titles of papers should be sent to the Secretary, Charles L. Parsons, Box 505, Washington, D. C.

The following chairmen of committees have been appointed:  
*Executive Committee*, Frederick W. Weissmann.  
*Finance Committee*, Archibald Campbell.  
*Transportation and Excursions*, Gordon Farnham.  
*Press, Publicity and Printing*, C. T. P. Fennel.  
*Reception and Registration*, J. W. Ellms.  
*Ladies' Reception*, Mrs. J. W. Ellms.  
*Entertainment*, Richard Lord.  
*Smoker*, F. C. Broeman.  
*Banquet*, L. W. Jones.  
*Meeting Places*, John Uri Lloyd.

CHAS. L. PARSONS

#### BUREAU OF STANDARDS' ANALYZED SAMPLES

The Bureau of Standards, Washington, D. C., is prepared to issue a sheet brass of the following composition, approximately:

	Per cent		Per cent
Tin.....	1.0	Zinc.....	27.0
Lead.....	1.0	Iron.....	0.3
Copper.....	70.3	Nickel.....	0.5

The fee, payable in advance is \$3.00 per sample of about 150 grams weight.

S. W. STRATTON, *Director*

January 6, 1914

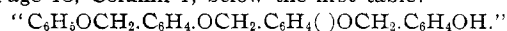
#### SYNTHETIC RESINS—CORRECTION

We note the following errors in our article under the above title, THIS JOURNAL, 6, 3.

(1) Page 8, Column 1, four lines from the end, the equation should read:



(2) Page 10, Column 1, below the first table:



(3) Page 13, Column 2, line nine from the end:

"79 per cent" should read 76 per cent.

L. V. REDMAN  
A. J. WEITH  
F. P. BROCK

January 21, 1914

#### VEGETABLE OILS EXPORTED FROM CHINA, 1912

The *Oil, Paint and Drug Reporter* states that exports of vegetable oils from China in 1912 amounted to 35,046 net tons of bean oil, 20,281 net tons of peanut oil, and 44,815 tons of wood, tea seed and other oils.

#### ANNUAL TABLES OF CONSTANTS, ETC., VOL. III.

Volume III of the Annual Tables of Constants and Numerical Data, Chemical, Physical and Technological, published by the International Commission of the VIIth and VIIIth International Congresses of Applied Chemistry is now in press and will be issued in the first half of 1914. A descriptive circular with references to reviews of previous volumes may be secured on application to The University of Chicago Press.

The *subscription* to Volume III is now opened and will be closed March 31, 1914. The names of subscribers should be sent to The University of Chicago Press, the American agent for the distribution of the Annual Tables. Subscriptions are payable to The University of Chicago Press at the time of publication.

The subscription price of Volume III will be the same as for Volume II, namely, \$6 for the unbound copy, \$6.80 for the