3. The posterior lobe causes marked contraction of the body walls and at least apparent retardation in growth.

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June 14, 1920

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The determination of the specific heat of heavy mineral oils: Herbert Bailey and C. B. Edwards. There is apparently very little information available concerning the specific heats of heavy mineral oils at temperatures of 150°–250° C. Such information is often needed in connection with the proper design of plants in which such oils are used as the heat transfer medium. In order to ascertain the specific heat of a particular oil over short temperature intervals between 120°–235° C. a simple apparatus was devised, consisting of a quart vacuum jacketed fruit jar, a small electrically heated resistance coil, and a motor driven glass stirrer. After obtaining, experimentally, the water equivalent of this calorimeter, and its cooling curve, measurements were made of the rate of rise in temperature of a definite amount of oil in the apparatus when heated with a nearly uniform input of electrical energy. For the particular oil varied from 0.543 for the range 120°–140° C. to investigated, it was found that the specific heat 0.630 between 215°–235° C.

The freezing points of mixtures of sulphuric and nitric acids: W. C. Holmes. Freezing points were determined on three sets of mixtures of sulphuric and nitric acids, having total acidities of 100 per cent., 95 per cent. and 103 per cent. respectively, in which the content of nitric acid was varied from 0 to 50 per cent. In the case of the 100 per cent. acidity mixtures, the freezing point of the sulphuric acid was depressed by the addition of nitric acid until a minimum was reached, when 5.5 per cent. HNO_3 was present. On further increasing the nitric content, a sharp rise in the freezing point to 2.3° took place, with a nitric content of approximately 11 per cent. It seemed probable that the composition at this maximum represented a definite chemical compound between sulphuric and nitric acids, the acids being present at that point in the proportion $5H_2SO_4$–HNO_3. The freezing point curve showed a similarity to that of sulphuric acid and water. The freezing point curve for the 95 per cent. and 103 per cent. mixtures showed a general similarity to that of the 100 per cent. acids, and possessed similar maxima and minima. They were complicated by the presence of a third constituent, water and free sulphur trioxide, respectively.

Strength and velocity of detonation of various military explosives: W. C. Cope. The strength of various military explosives that were used or proposed for use during the European War has been determined by the ballistic mortar in terms of TNT which is taken as a standard. Several explosives not used for purely military purposes are also given for comparison to aid in fixing the comparison in the mind. The velocity of detonation of several explosives confined in iron pipes $1\frac{3}{16}$″ inside diameter was determined by the Dautriche method and compared with TNT. The velocities ranged from 5,870 to 7,600 m./sec. Several explosives contained in three inch base detonating shells were detonated and the resulting fragments compared using TNT as a standard.

Potash and reconstruction: J. W. Turrentine. Since the signing of the armistice, when most of the American potash-producing plants suspended operations, imports of foreign potash have not been great enough to supply America's requirements even at the lower prices prevailing. The situation is critical, for the American industry has been demoralized and the foreign industry has not been able to function. This is bad enough, but there is the additional fact which makes matters many times worse; namely, Germany is quoting to the German farmer potash at a price of $2.70 to $3.00 per unit which was formerly sold to the American farmer at 60 cents wholesale, delivered free. On this basis the American farmer will have to pay Germany seventy-five millions per annum for even that quantity of potash used ten years ago and for which he paid an annual bill of fifteen millions. Can American agriculture stand this price for an essential fertilizer ingredient and can it afford to do without?

The experimental kelp-potash plant of the U. S. Department of Agriculture. Second report: J. W. Turrentine. The processes under development have been brought to the point where the only potash produced now is high-grade muriate (85 per cent. KCl). This is being yielded and marketed in such quantity as to pay a very substantial part of the entire expenses, both operating and experimental, of the enterprise. By-products, bleaching carbon and iodine, are being commercial-

ized, and in the immediate future will be turned out in such quantity as to increase proceeds from sale of products to a point where all expenses will be equaled and a profit established. In the meantime other by-products of proven value, such as ammonia, are being developed and soon will be put on a commercial basis.

The reactions of coal sulfur in the coking process:[1] ALFRED R. POWELL. Previous work has indicated that sulfur exists in coal in three typical forms—pyrite or marcasite, sulfates and organic sulfur. A study of the changes which these forms undergo during coking has been made on a variety of coals, and the following five classes of reactions established. (1) Complete decomposition of the pyrite and marcasite to ferrous sulfide, and hydrogen sulfide. (2) Reduction of sulfates to sulfides. (3) Decomposition of the organic sulfur to form hydrogen sulfide. (4) Decomposition of a small part of the organic sulfur to form volatile organic sulfur compounds. (5) Disappearance of a portion of the ferrous sulfide and pyrrhotite, the sulfur apparently entering into combination with the carbon.

The desulfurizing action of hydrogen on coke:[2] ALFRED R. POWELL. A complete study has been made of the efficiency of hydrogen and gases containing hydrogen as desulfurizing agents when passed through coal in the process of coking. The effect of the hydrogen on the removal of sulfur from coke was very noticeable, in some cases nearly all of the sulfur being removed as hydrogen sulfide during a period of three hours. The ordinary sulfur coking reactions were affected in two ways by the passage of hydrogen through the coking mass: (1) the pyrite was caused to decompose at a much lower temperature, (2) the coke sulfur, which is presumably in combination with carbon, was elimination at an almost constant rate at the higher temperatures of the coking process. The size of the particles of coal did not seem to affect the rate of evolution of hydrogen sulfide. For gases containing hydrogen, the desulfurizing efficiency seemed to be proportional to the partial pressure of the hydrogen.

The analysis of sulfur forms in coal:[3] ALFRED R. POWELL. An investigation of the applicability to a variety of coals other than those from Illinois of the Powell and Parr method of analysis for the forms of sulfur in coal (Bul. 111, University of Illinois Engineering Experiment Station, Urbana, Ill., 1919). A complete study was made of the sulfur as it existed in the following coals—Upper Freeport, Pa., Pittsburgh seam, Pa., Pocahontas No. 3, W. Va., Letcher Co., Ky., Morgan Co., Tenn., and Cherokee Co., Kan. The method of analysis gave excellent results when applied to these coals. In the determination of pyrite, the iron-sulfur ratio checked in every case with the theoretical. After the extraction of the pyrite and sulfates, the remaining sulfur was proved to be organic in nature.

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[2] Published by permission of the director of the Bureau of Mines.

[3] Published by permission of the director of the Bureau of Mines.

DIVISION OF WATER, SEWERAGE AND SANITATION

J. W. Ellms, *chairman*

W. W. Skinner, *secretary*

Sewage disposal committee of the National Research Council: EDWARD BARTOW. This committee has been appointed to consider the many problems connected with sewage disposal and the recovery of valuable ingredients. The problems to be considered include:

1. Colloids and their effect on sewage disposal.
2. Fertilizer value of sewage sludges.
3. Content and value of grease.
4. Special processes of sewage disposal.
5. Bacteriological problems.
6. Pacific Coast problems.
7. Sewage experiment stations.
8. Primary sewage treatment including use of screens and tanks.

The committee asks the cooperation of officials, engineers, chemists, bacteriologists and others who are in charge of or connected with treatment plants or experiment stations, or who may be consultants on the design, construction or operation of such plants. Those willing to assist in the work may notify the chairman, E. Bartow, Urbana, Illinois.

Relationship of H-ion concentration of natural waters to carbon dioxide content: R. E. GREENFIELD and G. C. BAKER. The H-ion concentration of most natural waters may be fairly accurately calculated by use of the simple mass law equation of the primary ionization of carbonic acid. Bicarbonates and free carbonic acid are determined as directed in Standard Methods of Water Analysis A.P.H.A. Bicarbonates are considered 85 per cent. ionized and the carbonic acid determination is corrected for the free carbonic acid still left in the solution at the endpoint of the titration. When the free carbonic acid is expressed in parts

per million of CO_2 and the bicarbonates in parts per million of $CaCO_3$ this equation becomes:

$$\text{H-ion Concentration} = \frac{4.0 \times 10^{-7}}{HCO_3} CO_2 + 1 \times 10^{-8}.$$

When both free carbonic acid and bicarbonates are expressed in either parts per million CO_2 or cc.CO_2 the equation becomes:

$$\text{H-ion Concentration} = \frac{3.5 \times 10^{-7}}{HCO_3} CO_2 + 1 \times 10^{-8}.$$

Preparation of ammonia-free water: G. C. Baker. Ammonia free water may be prepared by passing distilled water through permutit. This method has advantages over other methods in (*a*) ease of operation and (*b*) production of large quantities at minimum expense. Its disadvantages are (*a*) gives a water of higher mineral content and (*b*) does not remove nitrate, nitrate or albuminoid nitrogen. Indications are that American Permutits, except the especially prepared Folin Permutit will not quantitatively remove ammonia, but the English and German Permutits seem satisfactory.

Sewage treatment at Fort Myer, Virginia: J. W. Sale and W. W. Skinner. Sewage at Fort Myer is treated by settling, septicization, and aeration. The system cost about $8,000, was designed for a population of 2,000 and was used a model for plants at other cantonments. A chemical and bacteriological investigation extending over a period of six days showed that the effluent was stable and sludge inoffensive. It is believed that this type of plant warrants the consideration of small towns which contemplate installing sewage disposal systems.

The nitrate content of five hundred waters which were considered safe from a bacteriological standpoint: M. Starr Nichols. Nichols reports the nitrate nitrogen findings of 767 ground waters which were found to be safe bacteriologically. 81.7 per cent. of the waters examined had nitrate nitrogen values of between 0 and 5 parts per million, and 56.8 per cent. gave nitrate nitrogen values of between 0 and 1.0 part per million. He cites extracts and data of other investigators and points out that his work as well as do that of other workers, show that high nitrates are not a component of normal safe waters. He cites instances which show that a well may be subject to pollution and yet not be detected by bacteriological methods. The evidence indicates, so the author believes, that the nitrate determination should be made in addition to the bacteriological examination of every ground water and if found in greater quantities than 5 parts per million the source should be considered unsafe until a competent sanitary survey shows no possible source of pollution.

Seasonal variations of bacterial flora during filtration process: Harry E. Jordan. Following the operation of a water purification plant in the central states over a period of sixteen years—a series of some 50,000 examinations in a 5-year period is summarized with relation to seasonal ratios and variations by various types of organisms present. This data shows: (1) Bacterial concentration of all types studied, and the proportion of all types which are of the Coli group, is inversely proportional to the temperature. (2) Both sedimentation and filtration exercise a selective action against organisms of the Colon group and sterilization with chlorine products exercises a remarkably increased selective action against these organisms. (3) Of the total number of Coli type organisms present the fecal subtype survives purification processes—step by step—in increasingly less proportion as the temperature rises.

A study of sewage and trade wastes at Bridgeport, Conn.: W. W. Skinner and J. W. Sale. The investigation covered a period of one year and was made in cooperation with the Bureau of Fisheries in the interests of fish and shell-fish life. Dissolved oxygen data were obtained and the composition of about twenty effluents determined. Metals and acid from copper mills and waste dyes from textile mills were the chief problems given consideration. The water in the harbor is toxic to oyster larvæ. Remedial measures are contemplated.

Charles L. Parsons,
Secretary

(To be continued)

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